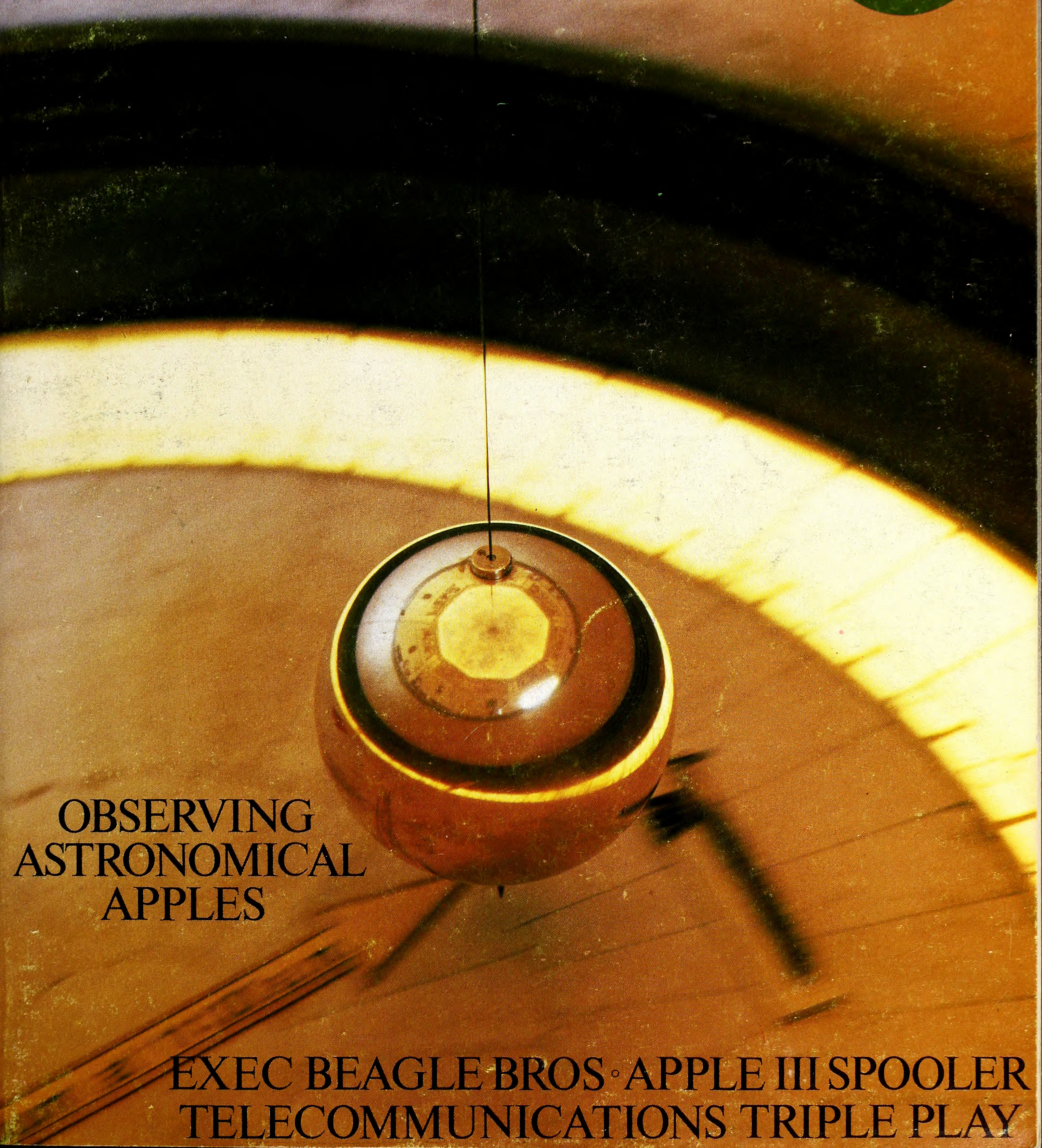
SOFTALK

VOLUME 4 OCTOBER 1983 $3.00



OBSERVING ASTRONOMICAL APPLES

EXEC BEAGLE BROS · APPLE III SPOOLER

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SOFTALK

OCTOBER 1983

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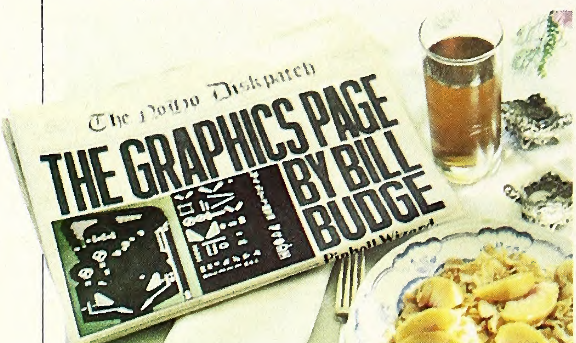

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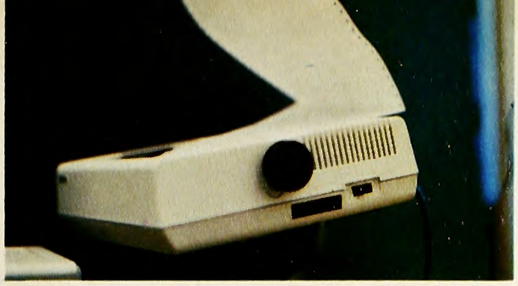

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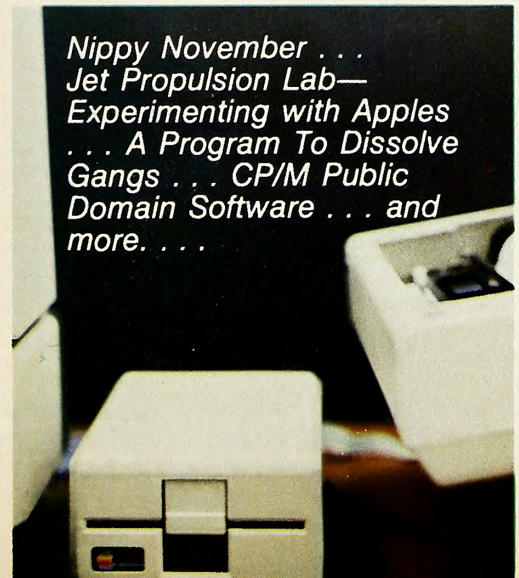

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On Our Cover: The Foucault pendulum at Griffith Observatory, Hollywood, California. The pendulum swings in a constant line; as the earth rotates beneath it, the pendulum knocks over sequential blocks on the floor. Photo by Kurt Wahlner.

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West Coast Sales	Mike Antich
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	Softalk
	11160 McCormick Street
	Box 60
	North Hollywood, CA 91603
	(213) 980-5074
East Coast Sales	Ian Ross
	Paul McGinnis
	Advertising Sales
	690 Broadway
	Massapequa, NY 11758
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Problems? If you haven't received your *Softalk* by the fifteenth of the month, or if you have other problems with your subscription, Hal Schick can help out. Call (213) 980-5074.

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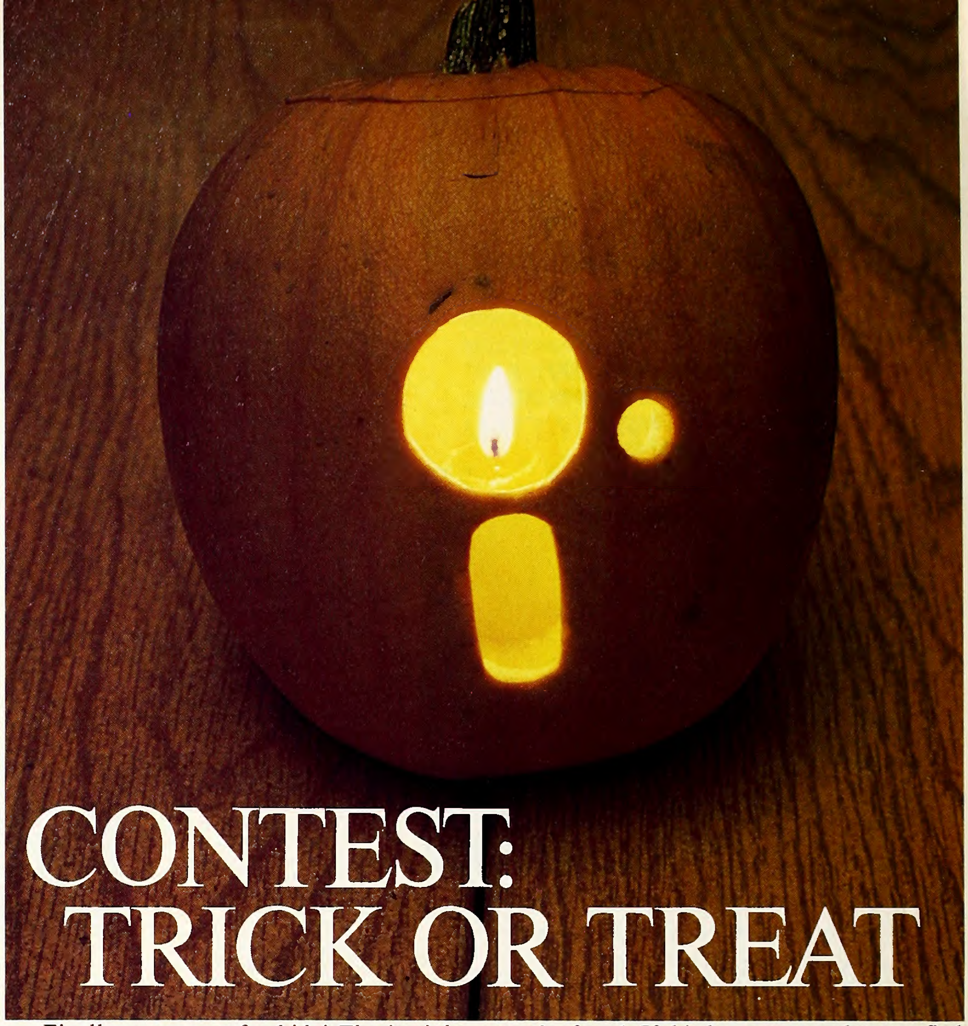


CONTEST: TRICK OR TREAT

Finally, a contest for kids! That's right, all kids under the age of one hundred fifty-two can play.

The San Francisco Applefest takes place October 28–30, and rumor has it that there will be a massive trick or treat in the Moscone Center on Monday, October 31. All you have to do is show up, tell the security guards you're there for the trick-or-treat party, and go in. Once inside, go from booth to booth, with your plastic bag in hand, and ask for software, hardware, and other goodies from the exhibitors. It's easy!

For those who can't or don't feel like taking part in the city-by-the-bay extravaganza, here's a contest for you.

Later on in this contest, you'll find a list of fifty treats we want you to find. Some are ordinary items you can find around the house, while others are not-so-ordinary items you probably couldn't find in a hundred years. This complicates things a bit. The ordinary items offer no challenge, and the others make the contest impossible.

Through the miracle of magazine publishing, we have been able to come to a compromise. The treats we want you to find are scattered throughout this issue of *Softalk*, and all you have to do is flip through the pages, find them, and write them down.

Some of the treats in question can be found in pictures, some are hidden in text, and some are indirectly referred to. For example, if the treat listed here were "candy bars," you would look for a picture of some candy bars, just the words, "candy bars," or even "Almond Joy." Finding either a picture or the words is good enough; you don't have to find both. In some cases, there will be several places where treats can be found. If this happens, you have to find only one.

Sorry, finding them in the contest section of the magazine doesn't count, but anywhere else in the magazine does. That's right. You can look in articles, photographs, ads, drawings, or even your mailing label.

Items on the treats list that refer to words, rather than pictures, must be found exactly as they appear here. For example, "safe deposit box" in number nineteen cannot be extracted from "safe deposit boxers."

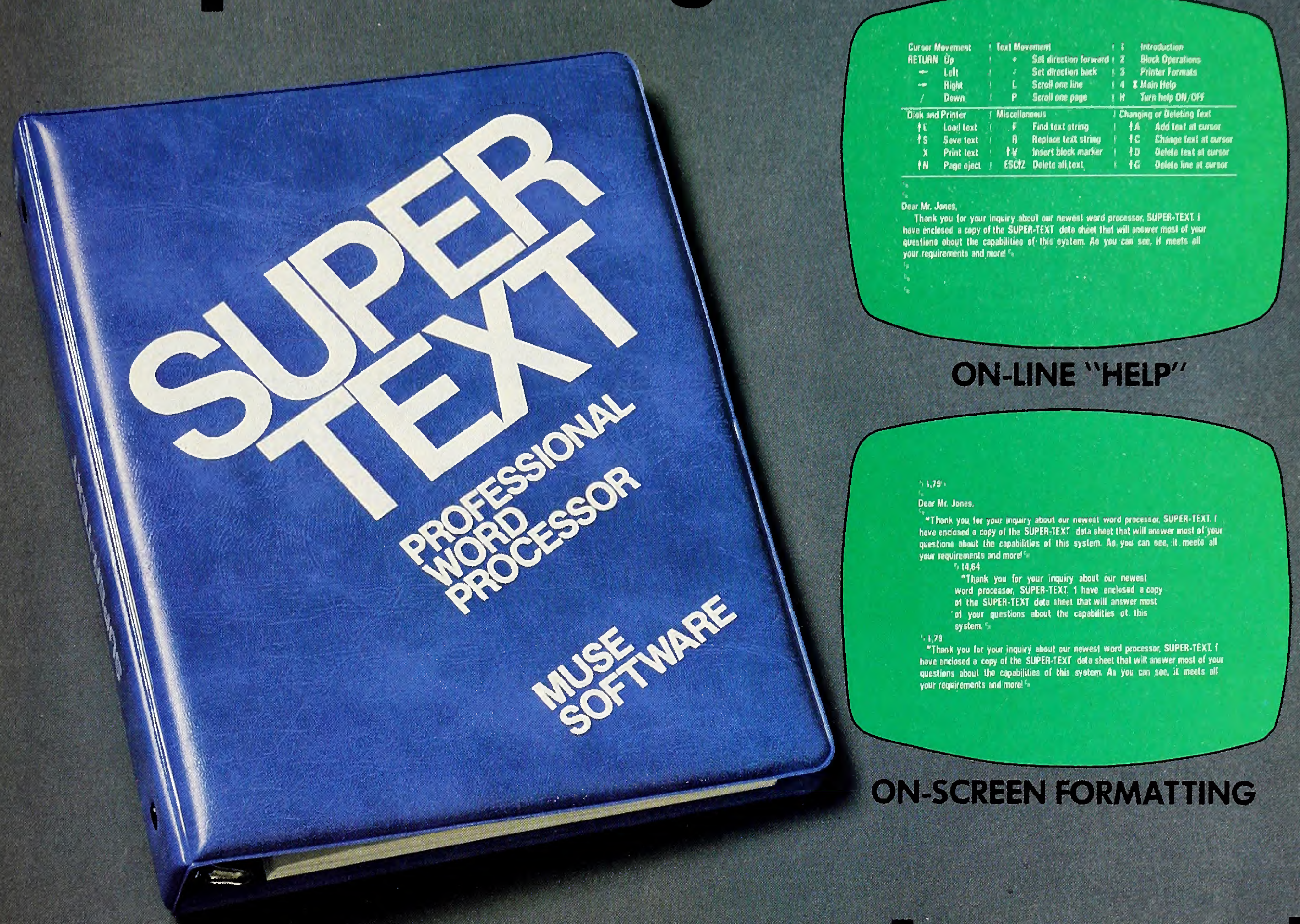
Get Your Costumes On. Number your paper from one to fifty, and write each treat by its corresponding number. When you have found a treat, write a short description of where in the magazine you found it. Example one: scissors—page 347, second paragraph, right-hand column, third line; if it helps, include the sentence you found it in. Example two: chopsticks—the middle-left side of the Oriental Express word processor ad on page 2.

Simple? You betcha. Ah, but there is a small catch. Not all the treats listed on the next page are found in the magazine. Those you can't find are tricks. If you suspect that a certain item can't be found in the magazine, write "trick" after it. Example: Atari 810 disk drive—trick!

We won't tell you how many tricks there are mixed in with the treats, but if you have really keen eyes you'll be able to figure it out.

The trick-or-treater who compiles the most accurate list of tricks and treats will be treated to $200 worth of *Softalk* advertisers' products. In the case of a tie (ha!), the entry with the scariest appearance will receive special consideration. The tie, however, will be broken by the spooky random number generator.

SUPER-TEXT Professional does everything the competition does, except one thing.



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It doesn't cost nearly as much.

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So, search carefully and send in your entry postmarked no later than November 15, 1983 (late entries will be dumped unceremoniously in the Contestmeister's wastebasket), to Softalk Tricker Treat, Box 60, North Hollywood, CA 91603.

Name: ________________
Address: ________________
City, State, Zip: ________________
Phone number: ________________
What I'd like to be treated to if I win: ________________

Here's the list of treats (and tricks?) you gotta find:

1. Olympic rings
2. Lloyd's of London
3. the New Mutants
4. Mexico
5. old maid
6. 0274-9629
7. seaweed
8. some Energizer batteries
9. jack-o'-lantern
10. catowlroo
11. halo
12. Taxan RGB monitor
13. manhole cover
14. sleeping giant
15. LisaCalc
16. Wall Street Jo
17. neon signs
18. covered wagon
19. safe deposit box
20. Tupperware
21. albatross
22. pizza
23. videocassette
24. roulette wheel
25. collie
26. children's carrousel
27. color slides
28. ink pearl
29. internal combustion engine
30. Duran Duran
31. bandstand
32. golf tee
33. three trombones
34. not Wilma or Pebbles, but Fred
35. spitballs
36. taxicab
37. popcorn
38. periscope
39. family roots
40. Madagascar
41. pina coladas
42. flimsies
43. Horsehead
44. warped tennis racquet
45. a doctor and a bird
46. vizual terms
47. Alaska
48. you-know-who
49. crystal diode
50. $35,000

CONTEST WINNERS

July's I'm Bored with Games contest was one of the more popular ones we've had in a while. Most entries were quite imaginative and well written. If there wasn't a penalty for being overdrawn at the bank, we would have awarded $100 first prizes to about half of the contestants. Unfortunately, our bank isn't very understanding when it comes to contests, so we could have only one winner.

Many entries seemed to contain similar features: 3-D holographic images, mind-controlled computers, and video screens in the form of geodesic domes.

Since it was hard to tell one game from another, we also looked at game plot. Those that didn't have any plot at all were eliminated, and those that involved senseless violence and irrational destruction were also given the back seat.

When the dust had cleared, the entry that stood out belonged to Sandra Caliguire (Ocala, FL), who submitted not only a game but an entire game system that had various modules available for it. One of the more original touches that Caliguire added to her Vicarious Simulations system was that some of the scenarios were historic rather than futuristic.

Caliguire's winning entry is a home entertainment console as well as a computer game. Here it is, along with just a few scenarios:

Vicarious Simulations. By Sandra Caliguire. Are you frustrated by the lack of reality in today's fantasy games?

Does receiving fifty-nine different inane answers to the command "cut tree" make you want to hang the adventure programmer?

If so, why not try Vicarious Simulations!

Using only the freshest of hardware innovations, Vicarious Simulations systems make your fantasies come alive. VS hardware required with all scenarios for full enjoyment:

Holographic Digitizer and Viva Voice Speech Trapper. For ideal system startup, allow these devices to record your movement and speech for reference in real-time gaming. Up to a dozen different friends or family members can be stored on disk for recall in your fantasies.

Insta-Laser Videodisc Recorder. Special analog interfaces carry disk information to the videodisc recorder, creating a video image of the fantasy in progress, which can later be shown on your own television—a fantastic way to impress friends and beat those rerun blues.

Organic Modem (version 2.3, compatible with 6502 chip). Perfected after months of testing at the San Diego Zoo, this electronically charged, electrode-studded headband creates a two-way path between the computer and you. Your neuromuscular reactions to thoughts are coded as analog waves and transmitted to the Apple, which decodes the data instantaneously. No longer will the frustrated adventurer bang the keyboard in despair over two-word commands. Full thought parser included.

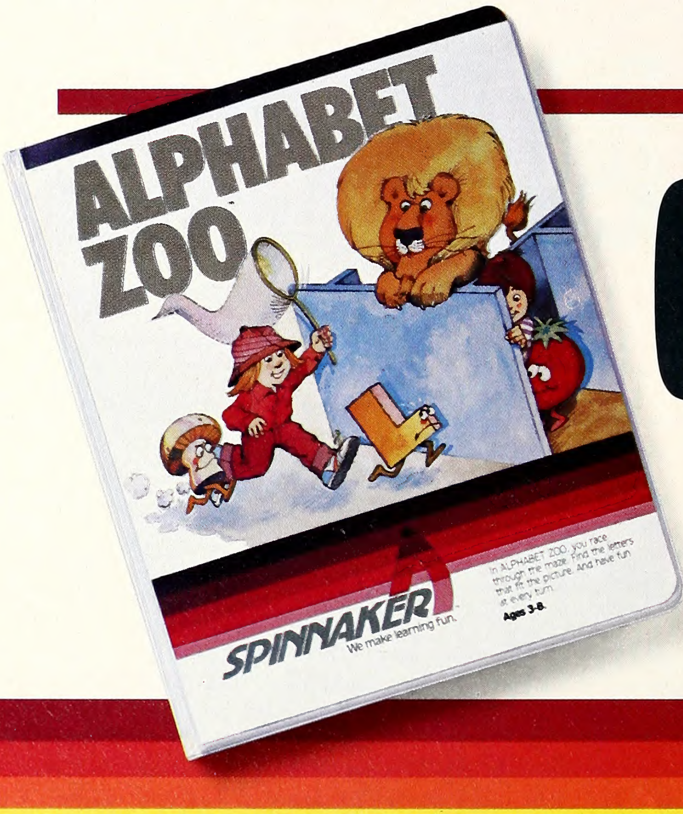
Additionally, the Organic Modem will permit your Apple to transmit all sense-oriented data. Now you can actually taste that mug of brew and feel the slash of a sword. Most important, you will actually

SPINNAKER'S LINE OF EARLY LEARNING GAMES IS GROWING AS FAST AS YOUR CHILD'S MIND.

Watching your kids grow up is a lot of fun. But making sure their minds grow as fast as their bodies is even more rewarding. That's where we can help. With a growing line of Early Learning Programs that are not only lots of fun to play, but also educational.

Some of the games you see on these two pages help exercise your child's creativity. Others help improve vocabulary and spelling skills. While others improve your child's writing and reading abilities. And all of them help your child understand how to use the computer.

So if you're looking for computer programs that do more than just "babysit" for your kids, read on. You'll find that our Early Learning Programs are not only compatible with **Apple,® Atari,® IBM®** and **Commodore 64™** computers, but also with kids who like to have fun.



A trip through Alphabet Zoo.™ Ages 3 to 8.

It's a race. It's a chase. It's Alphabet Zoo, the exciting game that will have your kids zipping through the maze, after letters that fit the picture on the screen.

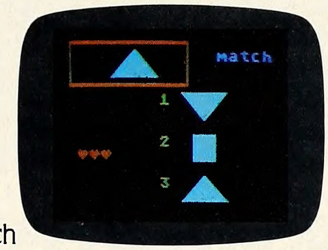
And at the same time, your kids will be learning the relationship of letters and sounds, and sharpening their spelling skills. So they'll be laughing and learning at every turn.

The story of STORY MACHINE.™ Ages 5 to 9.

STORY MACHINE is like a storybook come to life. Using the keyboard, your children write their own fun little stories. The computer then takes what they've written and animates their story on the screen, complete with full color graphics and sound.

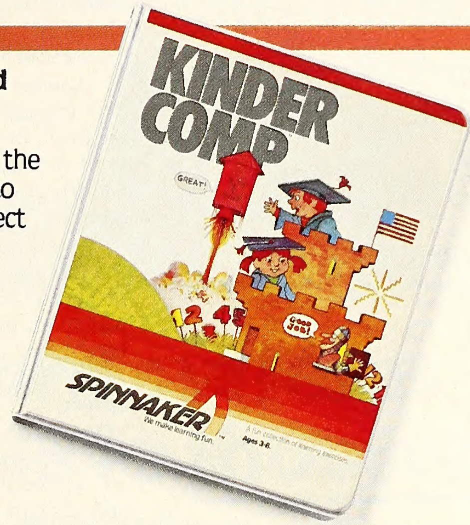
STORY MACHINE helps your children learn to write correctly, become familiar with the keyboard, and lets them have fun exercising their creativity at the same time.

KINDERCOMP.™ Numbers, shapes, letters, words and drawings make fun. Ages 3 to 8.



KINDERCOMP is a game that allows very young children to start learning on the computer. It's a collection of learning exercises that ask your children to match shapes and letters, write their names, draw pictures, or fill in missing numbers. And KINDERCOMP will delight kids with colorful rewards, as the screen comes to life when correct answers are given.

As a parent, you can enjoy the fact that your children are having fun while improving their reading readiness and counting skills.



FACEMAKER™ makes faces fun. Ages 4 to 12.

FACEMAKER lets children create their own funny faces on the screen. Once a face is completed, your children will giggle with delight as they make it do all kinds of neat things: wink, smile, wiggle its ears, or whatever their imagination desires.

Plus, FACEMAKER helps children become comfortable with computer fundamentals such as: menus, cursors, the return key, the space bar, simple programs, and graphics. FACEMAKER won't make parents frown because their children will have fun making friends with the computer.

SPINNAKER™
We make learning fun.

Disks for: Apple, Atari, IBM, Commodore 64.
Cartridges for: Atari, Commodore 64

Can you pick out the meteorologist here? Yep, it's David Cook (Decatur, IL) on the left. He was the winner of Oracle '83, Part Five, predicting the temperature in San Jose on the Fourth of July. Jay Nicole, manager of Main Street Computer, hands over Cook's prizes, *Knight of Diamonds* and *Zork II*.

see through the eyes of your character, instead of the monitor screen. You are the character.

Current VS scenarios include:

London 1350. Relive the merry olde days of yore, compleat with the realities of the Black Death vividly re-created. Watch a third of England waste away. Avoid family and friends in a desperate scramble for survival.

Washington D.C.: The Nixon Years. Guaranteed rollicking fun for all budding politicians and Watergate buffs. Join in the backroom schemes and trickery; will you be a minor aide, a major fool, or Tricky Dicky himself? See how long it takes to get caught.

Star Trek, Again (for die-hard fanatics only). All one hundred episodes are included, as well as the movies and various springboard scenarios. Enlist as your favorite character or become one of the faceless four hundred that walk the halls of the *Enterprise*. Manipulate events by your actions! Sell your videodisc adventure to Gene Roddenberry as a movie premise!

Caliguire will be skipping down to Personal Computer Center in Ocala, where she'll grab Penguin's *Graphics Magician* and a joystick as her prizes.

Not everyone opted to create a game. Bruce Youmans (Utica, NY) followed the Bruce Artwick/SubLogic school of thought and designed a simulation program.

Youmans's *Rollercoaster Simulator* included "Optoscan video contact lenses (RGB option available soon; specify prescription if any) that display every detail through sixteen inverted loops, twelve flaming hoops, and the Cave of Death. The lenses also read each eyelid position, acting as paddle controls for left and right banking of your coaster car." Whoa.

Darren Vengroff (Lubbock, TX) is a little confused. We ran a contest like this one back in 1946. Vengroff was probably thinking of that contest when he sent in his entry:

Bounce. Bounce is the latest creation from the Texas A&M department of software engineering. The game uses the newly developed eight-by-eight hi-res graphics screen just patented by the Aggies' advanced graphics research lab.

At the beginning of the game, one of the sixty-four pixels on the screen lights up. This represents the ball. Incredible, isn't it? But wait, that's not all! Amazing as it may seem, a subroutine that's only 1.3 megabytes in length causes the ball to move to an adjacent pixel. This continues until the ball reaches the edge of the screen.

At this point in the game's development, the time required for the ball to reach the opposite edge has been reduced to an unbelievable 3.4 days. All this may have been too much for you, but there's still more.

Once it reaches the edge of the screen, the ball will literally bounce, reversing its direction and returning to the edge of the screen where it began. Wow! Unfortunately for game players, there is as yet no player interaction (except the thrill of watching the bouncing ball).

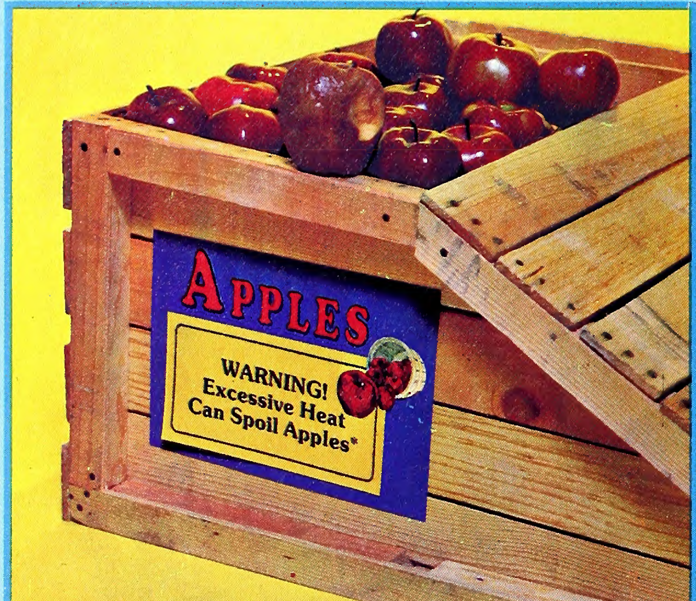
Another drawback of *Bounce* is the fact that the game isn't available to Apple users due to the machine's lack of graphics and memory capability. Available in punched paper tape (software) or vacuum tube (firmware) forms for Eniac and Univac only.

Marty Geil (Annapolis, MD) became bored with fighting imaginary monster enemies in *Wizardry*, so he solved the problem with his new game:

Spellbinding! is the three hundred fifty-eighth *Wizardry* scenario. The object is to descend all fifty levels of the dungeon, touch the fearsome slimedragon George, say, "You're it," and then escape with your life.

Where this game really shines is at those points in your wanderings at which you encounter monsters. No longer do you have to imagine the battle taking place. Instead of drawing a picture on your monitor, this version makes use of your Applink telepathy card to hypnotize people passing nearby, transport them to your house, dress them in monster costumes, and send them to fight you.

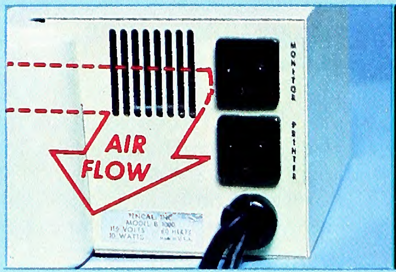
COOL+TIME™, the most advanced cooling ~~fan~~ system on the market can extend the life of your Apple II or IIe*!

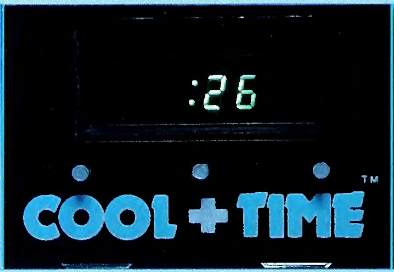


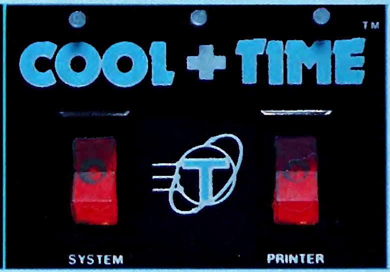
"... when many peripheral cards are plugged into the back of the Apple, inhibiting air flow and causing more heat output from the power supply... expansion and contraction *(results, which)* will eventually cause the components to malfunction. Fans ensure that your computer keeps cool and works smoothly."

inCider Magazine, July 1983, page 122

Patent pending







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In **Elapsed Time Mode** it accurately times functions from a few seconds to 24 hours. This provides a method of accurately budgeting/tracking time when using costly data bases, programming or other time-sensitive tasks.

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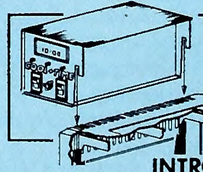

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FASTALK

Fastalk is a quick guide to popular, specialized, new, and classic software. When you need a particular kind of program or just want to see what's new, Fastalk is the place to look for fast answers.

If a program has been reviewed in *Softalk*, it carries the issue date of the review in italics at the end of its listing, and the capsule description given reflects the published review.

A new software entry, which must be of professional quality to be included, is designated by a check mark preceding its name. A new entry loses its check mark after its first appearance and drops out of Fastalk after one to three appearances (depending on genre) if it fails to gain popularity.

A bullet preceding a title indicates a program that *Softalk* has designated as a classic, based on its ability to stand up over time, its significance for its time (breaking new ground or introducing a new genre), or its archetypal qualities.

Other entries in Fastalk are there either by virtue of current activity (the programs are selling at least as much as the least-selling entry on any of the bestseller charts) or because they are representative of the best of programs for a special interest or need (such as card games or non-Basic-specific language terminal programs).

Softalk may arbitrarily omit any package from Fastalk, whether or not it meets the foregoing criteria.

Adventure

● **Adventure.** Crowther, Woods. The original text adventure, created on mainframe, contributed to by many over a long time. Very logical within fantasy framework, excellent puzzles, maps; complex, convoluted, and great. Several publishers: Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $28.95. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $35. Frontier Computing, Box 402, 666 N. Main St., Logan, UT 84321. $10.

● **Cyborg.** Berlyn. Text adventure with brief action skill game hidden in plot. As a futuristic part man, part robot, you're lost in a strange forest, desperately needing food and power. At its release, in its realism and use of true plot, *Cyborg* represented one of the most significant advances in adventuring since the original *Adventure*. Sentient, Box 4929, Aspen, CO 81612. $32.95. *11/81*.

The Dark Crystal. Williams. Hi-res adaptation of fantasy movie. New puzzles challenge even those who've seen the movie. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $39.95. *4/83*.

Deadline. Blank, Lebling. Episode one in a series of murder mysteries by the authors of *Zork*. Includes inspector's casebook, lab report. Text. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *8/82*.

Death in the Caribbean. Hess, Hess. Challenging quest for pirate treasure features a mischievous ghost, huge maze, lush graphics. Well worth it. Micro Lab, 2699 Skokie Valley Rd., Highland Park, IL 60035. $35. *9/83*.

✓ **Enchanter.** Blank, Lebling. First of trilogy sequel to *Zork*s expands interaction with other characters, goes above ground, increases use of logical magic. No big breakthroughs, but simply delightful. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *9/83*.

● **Hi-Res Adventure #1: Mystery House.** Williams. Whodunit in a Victorian mansion. First adventure with pictures. Two-word parser with logical comprehension. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $24.95.

Mask of the Sun. A unique animated graphic quest with full though sometimes frustrating parsing. Moving from room to room involves seeing scenery along the way go by—a graphics breakthrough with nice puzzles. Ultrasoft, 12503 Bell-Red Rd., #200, Bellevue, WA 98005. $39.95. *11/82*.

● **Prisoner 2.** Mullich. Totally relandscaped but loyal version of original game: full-color hi-res graphics added, puzzles reworded, obstacles expanded. Sophisticated and difficult exercise in intimidation with elements of satire. Escape from an island requires player to solve logical puzzles, overcome obstacles, and answer riddles. Excellent computer fare; nothing else like it. Edu-Ware, Box 22222, Agoura, CA 91301. $32.95. *The Prisoner, 3/81; Prisoner 2, 10/82*.

The Quest. Snell, Toler, Rea. As the king's newest advisor, you must accompany a champion on a dragon-slaying mission. Champion, parser accept advice in full and multiple sentences. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95. *9/83*.

● **S.A.G.A. Series.** Adams. Scott Adams's prototypical adventures—12 in all—spruced up with 100-color graphics and Votrax vocals. Fun, not always logical, very story-oriented series. Each adventure has its own theme and often exotic locale. They map small but score big on imagination. Adventure International, Box 3435, Longwood, FL 32750. $29.95 each. *7/82*.

✓ **Secret Agent: Mission One.** Ha ha, you're dead. Jor-And, Box 9180, Glendale, CA 91206. $32.95. *9/83*.

Serpent's Star. Anson, Clark, Franks, Ormsby. Mac Steele searches the Himalayas for a legendary sapphire in *Mask of the Sun* sequel. Traps are less obvious. Delightful glimpse of a faraway mystical land. Ultrasoft, 12503 Bell-Red Rd., #200, Bellevue, WA 98005. $39.95. *4/83*.

Starcross. Science-fiction prose adventure that comes wrapped in a flying saucer. Set in the year 2186, main puzzle is to discover *raison d'etre* of miniworld asteroid. Likable, engaging. Superior puzzles. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *11/82*.

Suspended. Berlyn. Well-plotted adventure demands control of six independent robots who can act simultaneously. Intelligent, challenging exercise in logic. A milestone. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *4/83*.

● **Swordthrust Series.** Set of adventures, seven so far, that integrate fantasy role playing. Create one character, make friends in each new adventure, battle monsters and achieve goals together. Good stories, fun to map. Vocabulary no mystery, but puzzles are. Single character goes through all. CE Software, 801 73rd St., Des Moines, IA 50312. Number 1 prerequisite for rest. Each adventure, $29.95. *8/82*.

Witness. Galley. It's 1938, a society woman is dead, the killer is loose and may strike again. You have 12 hours to figure out whodunit before someone else takes the deep six. It may be you. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *7/83*.

● **Zork I, II, III.** Blank, Lebling. Text lives! Three masterpieces of logic and grand adventure to revel in. Hard, logical puzzles with erudite parser that understands complete compound sentences and questions, has amazing vocabulary. *I* and *II* use standard scoring, standard goals; *III* has unique point system, and benevolence pays. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *Zork I, 6/81; Zork II, 3/82; Zork III, 9/82*.

Business

Accounting Plus II and **IIe.** *II* version is integrated package; general ledger, accounts receivable and payable, and inventory-purchasing modules. Menu-driven; prompting. *IIe* version is stripped and rebuilt to take advantage of available functions. Software Dimensions, 6371 Auburn Blvd., Citrus Heights, CA 95610. *II*, $1,250; *IIe*, $995.

Apple II Business Graphics. Converts numerical data into charts and graphs. Features mathematical and statistical functions. Requires 64K. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

BPI System. Popular six-module business package; programs also available separately. Includes *General Ledger* (a bestseller), accounts receivable, accounts payable, payroll, inventory control, and job costing. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $395 each; job costing, $595.

Bulk Mailer. Marinello. Hard disk mailer handles 32,000 names, retrieves a name by account number in two seconds. Floppy disk handles 1,200 names per disk. Includes zip code inventory, duplicate entry killer. A technical and functional advance. Satori Software, 5507 N. Woodlawn, Seattle, WA 98103. Floppy disk, $125; hard disk, $350. *6/83*.

Compuquote. Cost estimation and price-quoting system that allows user to update, inflate or discount prices, figure costs based upon labor and materials. Includes light pen for most data entry. Peripheral Visions, 5285 Elam Young Pkwy., B400, Hillsboro, OR 97123. $275. *9/83.*

dBase II. Speedy relational database-management system. Requires SoftCard. Ashton-Tate, 9929 W. Jefferson Blvd., Culver City, CA 90230. $700.

DB Master. Comprehensive database-management system with password protection, extensive report creation options. 1,000 characters per record. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $229. *10/81.*

DB Master Utility Pak #1 and **Utility Pak #2.** Compatible with version 111. Translates *DB* files to Apple text, restructures existing files, replicates and merges, and recovers crashed files. *Pak #2* includes label printer, global editor, file merge, reblocker, and forms printer. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $99 each.

✓ **FilePro.** Organizes files by any of 32 criteria, designs, prints up to 10 reports or mailing lists per file. Small Computer, 230 W. 41st St., #1200, New York, NY 10036. $300 with SoftCard.

✓ **Financial Planning for VisiCalc and the Apple II, Financial Planning for Multiplan and the Apple II.** Expert Systems. Series of 18 templates provides solutions to complex financial questions from real estate wraparound mortgage to break-even analysis. Howard W. Sams, 4300 W. 62nd St., Indianapolis, IN 46206. $79.95 each. *9/83.*

General Manager. User-definable database-management system; can use one to four disk drives or hard disk. Change screen and field formats without reentering data. Current version supports IIe and 80-column card at no extra cost. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $229.95. Hard-disk version, $374.95.

The Incredible Jack. Word processor, database, and spreadsheet, plus mailing label print and sort. Gives 80-column u/lc display automatically on the IIe, with 64K, 80-column card on the II Plus. Business Solutions, 60 E. Main St., Kings Park, NY 11754. $129. *8/82.*

InfoStar. Hajicek, Collier, Rubinstein. Database management for nonprogrammers. Maintains updates, generates simple or customized reports. MicroPro, 33 San Pablo Ave., San Rafael, CA 94903. $495.

List Handler. Keary, Elekman. List-lover's delight. Prints lists, labels, and letters. Handles 3,000 records per disk and eight disk drives. Takes requests. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $49.95. *2/83.*

MagiCalc. Graves. Electronic spreadsheet with automatic page formatting and support of additional memory boards up to 512K. Compatible with *VisiCalc* and *Magic Window II.* Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95.

Money Street. Easy to use checkbook financial system for small business, office, or home use. Keeps books, tracks deductions, helps cut expenses. CTS, Box 4845, Incline Village, NV 89450. $99.95. *9/83.*

Multiplan. Easy-to-learn electronic work sheet using plain-English commands. Powerful modeling and presentation capabilities. For use in analysis, forecasting, technical engineering, and the home. Versions 1.04 and up use 80 columns and extended memory on the IIe. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $275.

PFS:File. Page, Roberts. User controls data in totally unstructured database. Up to 32 pages (screens) of information in each record. IIe version has 80 columns, u/lc. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *10/80.*

PFS:Graph. Chin, Hill. Works alone or interfaces with files created with *PFS:File* and *VisiCalc.* Produces bar, line, and pie charts merging data from several sources. 80 columns and increased graphics support in IIe version. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *5/82.*

PFS:Report. Page. Powerful report generator designed for use with *PFS:File.* Sorts, calculates, totals, formats, and prints presentation-quality columnar reports. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *6/81.*

✓ **Postage Saver.** English, Hill. Mailing-list program sorts up to 30 data disks by zip code, name, special code or entry number. Helps save postage. Gray Matter Limited, Box 7900, Incline Village, NV 89450. $99.95.

Quick File IIe. Easy-to-use personal database filing system that generates reports, sorts. Fifteen fields; files as long as disk allows. IIe, two disk drives. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $100.

Risk Simulator. Estimates probability distributions related to risk situations, such as automobile maintenance expenses or employer funding of health benefits. Actuarial Microcomputer Software, 3915 Valley Ct., Winston-Salem, NC 27106. $185.

✓ **SDM: Screen Data Manager.** Gooding. Database manager featuring custom screen entry formatting and report generation. Twenty-one databases (mail, invoice, libraries, inventory) with 10 reports each. The Software Mill, 19 Grist Mill Rd., Acton, MA 01720. Two disks, $49.

State of the Art System. Standalone or interfaceable modules for a 12 month accounting period. Includes *General Ledger*, *Accounts Receivable*, *Accounts Payable*, *Payroll*, *Inventory Control* ($495 each), *Budget and Financial Reporting*, *Sale Invoicing* ($395 each), and *Professional Time and Billing* ($795). State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626.

Statpro. Imhof, Hewett, Blue Lakes Software. Complete workstation for data entry, storage manipulation, statistical and graphic analyses. Statistics module contains five sets of analyses: descriptive statistics, regression analyses, analysis of variance, time series analyses, and multivariate analyses. Wadsworth Electronic Publishing, Statler Office Building, 20 Park Plaza, Boston, MA 02116. Thirty-two disks, $1,995.

✓ **VIS/Bridge/SORT.** Utility allows user to sort either rows or columns of *VisiCalc* templates. Solutions, Box 989, Montpelier, VT 05602. $89. *9/83.*

● **VisiCalc.** Bricklin, Frankston. Electronic work sheet for any problem involving numbers, rows, and columns. No programming necessary. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250. *10/80.*

VisiSchedule. Critical path PERT schedule planner. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $300.

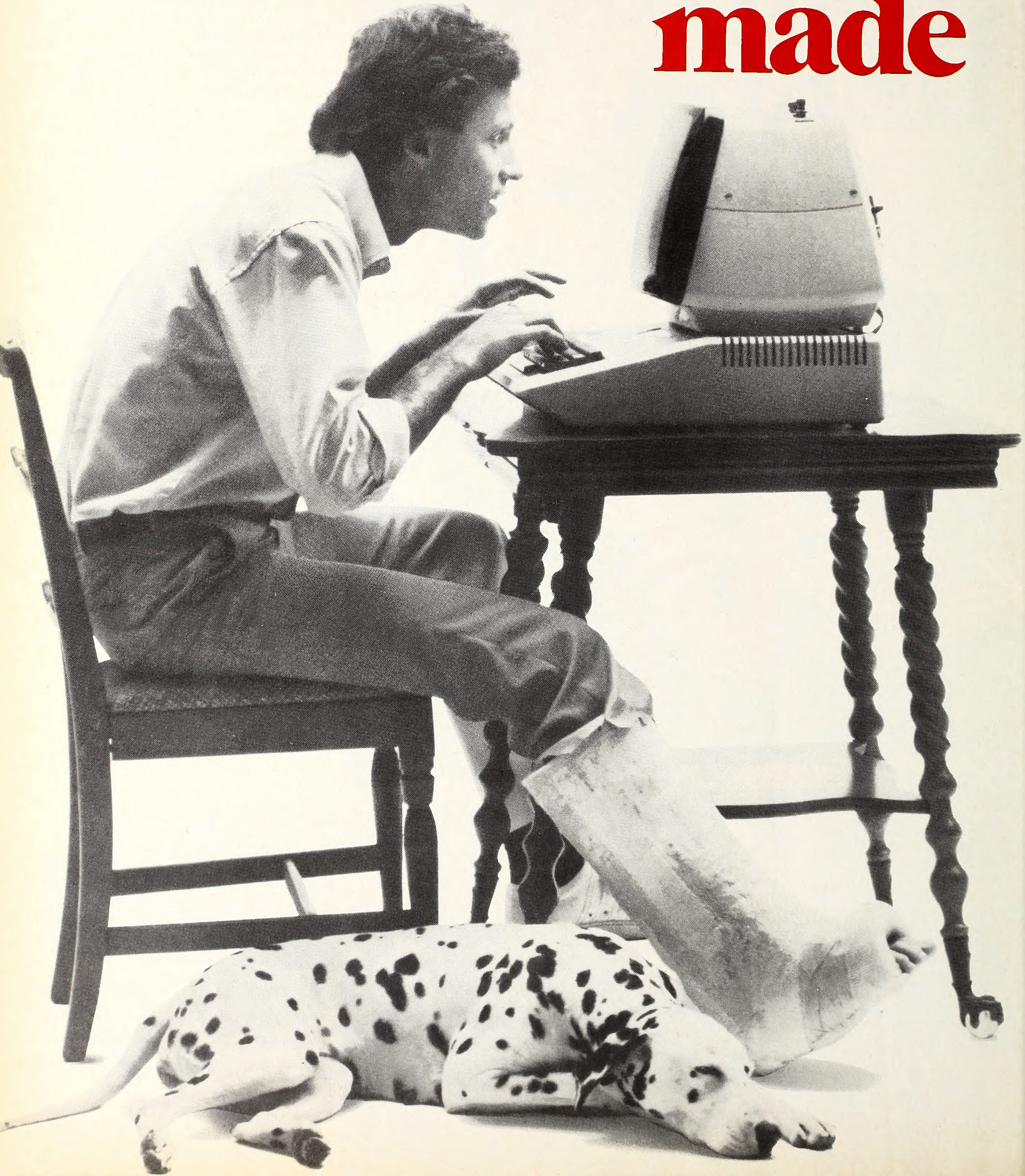
VisiTrend/VisiPlot. Kapor. Combines *VisiPlot* graphics with time-series manipulation, trend forecasting, and descriptive statistics. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $259.95. *7/81.*

Communications

Apple Link. Jaffe, Pierce. Creates intelligent terminal at receiving end with no additional software. Transmits random-access text files. Computer Applications, 13300 S.W. 108th Street Circle, Miami, FL 33186. $59.95. *8/82.*

ASCII Express: The Professional. Robbins, Blue. Greatly improved version of original modem software package features automatic redial, individual macro files, and conversion of Integer, Applesoft, or binary programs into text files. Works with a

How a fireman made



plethora of hardware. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95. *12/82.*

Data Capture 4.0. Copyable, modifiable smart terminal program; compatible with Apple III and most lower-case adapters. Southeastern Software, 6414 Derbyshire Dr., New Orleans, LA 70126. $65. *7/81.*

Dow Jones Connector. Guide to the use of the company's News/Retrieval Service and Blue Chip membership, too. Dow Jones Software, Box 300, Princeton, NJ 08540. $95.

Hayes Terminal Program. Standalone disk designed for the Micromodem II lets CP/M, DOS 3.3, and Pascal disks create, list, delete, send, and receive files. Opens access to nonkeyboard ASCII characters and prints incoming data as it's displayed. Hayes Microcomputer Products, 5835 Peachtree Corners East, Norcross, GA 30092. $99. *9/81.*

Micro/Courier. Electronic mail program. Provides file transfer of any DOS 3.3 file (correspondence, *VisiCalc*, charts) automatically and unattended, connected to another *Micro/Courier*. Built-in text editor; maintains 100 mailboxes; permits optional clock and calendar scheduling. Microcom, 1400A Providence Hwy., Norwood, MA 02062. $250. *9/81.*

Micro/Terminal. Access and exchange information with mainframes and minis, databases like the Source, and other remote terminals and personal computers. Allows keyboard mapping, u/lc, 80-column cards. Microcom, 1400A Providence Hwy., Norwood, MA 02062. $84.95.

P-Term: The Professional. Supports all Pascal-compatible interfaces, asynchronous serial cards, Apple-compatible modems, and baud rates up to 2400. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95.

Softerm. Stricklan. Emulation program makes the Apple II Plus into a look-alike for many other popular CRT terminals, allowing use of programs written for other terminals without programming changes. Also enables access to mainframes, time-sharing services, and other Apple computers. Keyboard macros and automatic answerback capabilities. Softronics, 6626 Prince Edward, Memphis, TN 38119. $150.

Transend 1, 2, 3. Intelligent-terminal software with multiple hardware compatibility. Advanced, easy to use. *1* sends text only; menu-driven, limited editor. *2* sends text and files like *VisiCalc*, verifies transmission. *3* does both and handles electronic mail with automatic redial, clock calendar, and password protection. Upgrade: difference in price between two packages plus $20 service fee. SSM, 2190 Paragon Dr., San Jose, CA 95131. $89, $149, $275. *9/82.*

Z-Term: The Professional. More than an update. Compatible with a great variety of modems, interface cards, and screen modes. Simple file transfer with integrity. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $149.95. *5/81.*

Fantasy

Role-playing games involving characters that develop through experience in adventuresome stories, and whose actions players determine via set commands.

● **Beneath Apple Manor.** Worth. The original dungeon game for the Apple, created in 1978. Newly released version has hi-res, sound effects, a few more magic items, but still the classic game. Quality, 6660 Reseda Blvd., #105, Reseda, CA 91335. $29.95. *2/83.*

Knight of Diamonds. Second scenario of *Wizardry*, requiring thirteenth-level characters from the original. Individual quests on each of six dungeon levels. Great. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $34.95. *7/82.*

Legacy of Llylgamyn. Greenberg, Woodhead. Third scenario in classic *Wizardry* series. To save Llylgamyn, descendants of the adventurers of other *Wizardry* scenarios (requires *Overlord*) must wrest a mystical orb from the dragon L'kbreth. New full-screen dungeon, Lisalike information screens. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $39.95. *7/83.*

Missing Ring. Romine. Find wizard's missing ring alone or with the help of up to four independent characters. Task becomes more complex as number of players increases. Datamost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *7/83.*

● **Odyssey: The Compleat Apventure.** Clardy. Fantasy adventure far beyond one place and one setting. Castles, catacombs, an ocean voyage, and the orb of power. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $30. *10/80.*

● **Temple of Apshai.** Lead title in Dunjonquest series, winner 1981 Academy of Adventure Gaming Arts and Design "Computer Game of the Year" award. Epyx/Automated Simulations, 1043 Kiel Ct., Sunnyvale, CA 94086. $39.95.

● **Ultima.** British. Hi-res color adventure, progressing from Middle Ages to beyond the space age. A masterpiece. California Pacific, 757 Russell Blvd., Davis, CA 95616. $39.95. *6/81.*

Ultima II. British. Faster play in a bigger universe with a time-travel option. Typically British look and feel. Events are much more interdependent; larger realm of fantasy with more transactions available. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $59.95.

● **Wilderness Campaign.** Clardy. First fantasy game to leave the dungeon for the great outdoors; first in hi-res; first to bargain with merchants; and more. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $17.50.

● **Wizardry.** Greenberg, Woodhead. Ultimate role-playing fantasy; ten-level maze in hi-res. Generate 20 characters, six at a time on expeditions. Gripping game; superbly reproduced. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $49.95. *8/81.*

WizPlus. Conner. Utility for the *Wizardry* series that allows players to change, restore, add to, recover, edit, or move any character, equipment, spells, or treasure. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95.

Graphics

Alpha Plot. Kersey, Cassidy. Hi-res graphics and text utility with optional xdraw cursor and proportional spacing. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $39.50.

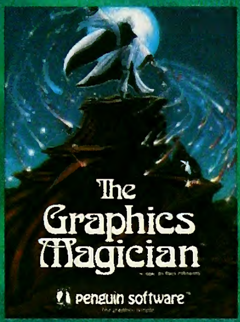
The Complete Graphics System. Pelczarski. A wealth of graphics tools at a reasonable price. Make 2-D drawings with game paddles, add text in destructive, nondestructive, or reverse modes; create 3-D figures and shape tables. Manual features complete outline of command structure. Penguin, 830 4th Ave., Geneva, IL 60134. $69.95; Apple Graphics Tablet version, $119.95. *7/81.*

Fontrix. Boker, Houston. Character generator creates unlimited number of typefaces, uses them to write on a screen extended 16 times. Extremely significant development in graphics. Data Transforms, 616 Washington St., #106, Denver, CO 80203. $75. *7/83.*

GraForth. Lutus. A graphics language rewritten for maximum speed. Plotting, line, text display, character image, and high-speed 3-D graphics, with variety of colors and drawing options. Includes music synthesizer. Insoft, 10175 S.W. Barbur Blvd., #202-B, Portland, OR 92719. $75. *8/82.*

The Graphics Magician. Jochumson, Lubar, Pelczarski. Outstanding animation package consisting of picture editor and shape-table extender. Comes

A slide show and presentation utility.



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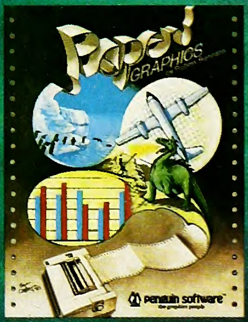

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with utility program to transfer binary files. Penguin, 830 4th Ave., Geneva, IL 60134. $59.95; Apple Graphics Tablet version, $69.95. *5/82.*

The Graphic Solution. Graphics editor and bit-mapping animation system using film-editing techniques. Save hi-res screen as standard DOS file. No programming knowledge necessary. Accent, 3750 Wright Pl., Palo Alto, CA 94306. $149.95. *7/83.*

LPS II. Superb hi-res-graphics drawing system with light pen. Draw freehand or use circles and lines to create geometric shapes. Fill routine with colors and patterns; fun animation demo; programmable Pentrak driver. Gibson, 23192-D Verdugo Dr., Laguna Hills, CA 92653. $349. *10/82.*

Micro-Illustrator. Island Graphics. Fun and friendly drawing program for the KoalaPad graphics tablet. Easy to learn and use, compatible with most game software. Koala Technologies, 4962 El Camino Real, #125, Los Altos, CA 94022. $124.95. *7/83.*

✓ **Prime Plotter.** Argon. Powerful and flexible plotter draws line, bar, pie charts; combines them with text, drawings for slide-show-like display. Doubles as general graphics tool. PrimeSoft, Box 40, Cabin John, MD 20818. $240; plotter interfaces $60 to $75. *9/83.*

Special Effects. Pelczarski. Artist's graphic package for creating and enhancing computer graphics. With 108 colors, 96 brushes, magnification and editing point-by-point. Reverse colors, create mirror images, move images. Penguin, 830 4th Ave., Geneva, IL 60134. $39.95. *3/82.*

Zoom Grafix. Holle. Graphics-printing utility allows display of picture on-screen prior to print; prints out selected portion at any size. Phoenix, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $39.95. *2/82.*

Home

The Accountant. Forman. Simple-to-use double-entry finance system features seven integrated files and a set of automatic transactions. A sleeper just beginning to get wider distribution. Decision Support, 1438 Ironwood Dr., McLean, VA 22101. $129.95. *1/82.*

Bowling Data System. Data Dynamics. Two-disk record-keeping and report-preparation program for infinite number of leagues, up to 40 teams. Weekly recap, season average, more. Rainbow Computing, 9719 Reseda Blvd., Northridge, CA 91324. $149.95.

● **Crossword Magic.** Crossword puzzle maker. Choose subject, words, and clues; program automatically connects words. Play on-screen or make printout. L&S Computerware, 1589 Fraser Dr., Sunnyvale, CA 94087. $49.95. *10/81.*

Dow Jones Market Analyzer (formerly *RTR Market Analyzer*). Automatically collects, stores, and updates historical and daily market quotes. Provides technical analysis and plots 18 different types of charts. Dow Jones Software, Box 300, Princeton, NJ 08540. $350.

Einstein Memory Trainer. Rubin, Samet. Interactive tutorial with color graphics and gamelike practice sessions teaches methods for remembering names, faces, phone numbers, dates, and lists. Set your own pace, store personal memory techniques. Three disks, user guide included. Einstein, 11340 W. Olympic Blvd., Los Angeles, CA 90064. $89.95.

Family Roots. Professional genealogy database with unlimited-records capability. Unprotected; works with 80-column and u/lc. Extensive documentation. Quinsept, Box 216, Lexington, MA 02173. $185.

Golf League Statistics. McQuinn. Manages, displays, and prints golf league statistics for up to 50 players and 20 teams. Tracks more than 100 statistics for each player in league. Disk Depot, 731 W. Colorado Ave., Colorado Springs, CO 80905. $139.95.

Golf Statistician. Haberle. Helps golfers lower their scores by examining their strengths and weaknesses. GolfSoft, 10333 Balsam Ln., Eden Prairie, MN 55344. $34.95.

Home Accountant. Schoenburg. Thorough, powerful home finance program. Monitors five checking accounts against a common budget, plus credit cards and cash; one-step record or transfer of funds. Continental, 11223 S. Hindry Ave., Los Angeles, CA 90045. $74.95. *4/82.*

✓ **I.Q. Baseball.** Carasik. Detailed hi-res trivia featuring tough questions that span history of both leagues. Wonderfully playable. For one or two. Davka, 845 N. Michigan Ave., Chicago, IL 60611. $24.95. *9/83.*

Know Your Apple, Apple IIe. Visually oriented computer tutorials with manuals cover disks, drives, and peripherals. Models of clarity. Muse, 347 N. Charles St., Baltimore, MD 21201. *Know Your Apple*, $34.95; *Know Your Apple IIe*, $24.95. *Know Your Apple, 3/83.*

Micro Cookbook. Recipe-management system allows entry and modification; selection of recipes by common ingredients, name, or classification. Calorie and nutrition guide. Virtual Combinatics, Box 755, Rockport, MD 01966. $40. *6/83.*

NFL Scoreboard. Football pointspread prediction system gives probable scores, team performance summary, divisional standings, and season playoff predictions. Can be used season after season. Micro Data, 741 Surrey Dr., Streamwood, IL 60103. $49.95.

✓ **OpVal.** Emmons. Stock option analyzer forecasts prices, tracks risk/reward potential, locates better trades. Receives market prices from Dow Jones or keyboard. CalcShop, Box 1231, W. Caldwell, NJ 07007. $250.

Personal Finance Manager. Gold, Software Dimensions. Handles 200 entries a month from 14 separate accounts. Search-sort-enter routine. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $75. *11/81.*

Power of Words. Funk. Ten interactive word games by the author of the *Reader's Digest*'s "It Pays To Enrich Your Word Power." Humor, graphics, auditory clues demonstrate words and reinforce memory. Funk Vocab-Ware, 4825 Province Line Rd., Princeton, NJ 08540. Two disks, $49.95. *7/83.*

ThinkTank. Idea processor program allows you to see ideas in outline form. Outline can be collapsed to see the big picture or expanded to reveal hidden details. Living Video Text, 450 San Antonio Rd., #56, Palo Alto, CA 94306. $150. *8/81.*

Home-Arcade

Fast-action skill games; may include elements of fantasy.

A.E. Horai. Blast away like mad in 3-D. Time the release and detonation of missiles and repel the next wave. Innovative graphics, new firing technique, and fugues to boot. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *2/83.*

● **Alien Rain.** Suzuki. Monsters in this classic seem to take it personally when you gun down one of their own kind. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *9/81.*

✓ **Apple Cider Spider.** Strand. Good but limited hopping and dodging game. Three preset levels. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $33.33. *9/83.*

● **Apple Panic.** Serki. Rid a five-story building of crawling apples and butterflies by running up and down connecting ladders, digging traps, then covering critters before they devour you. Extremely addictive, excellent hi-res play. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *9/81.*

The Arcade Machine. Jochumson, Carlston. Step-

by-step arcade-game designer—shapes, scoring, sound, and titles. Begin with variations on five games included, then on to your own. Broderbund, 1938 4th St., San Rafael, CA 94901. $59.95. *11/82.*

Axis Assassin. Field. Blast-away arcader that gives 3-D perspective of fighting grid, allows bottom-to-top movement. Twenty possible grids, five zones. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $35. *7/83.*

Aztec. Stephenson. Graphic fantasy arcade with animation throughout. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95. *1/83.*

Beagle Bag. Kersey. Twenty games and miscellany, written in Basic and unprotected. Great humor, good two-player games. Manual is worth the price of admission. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50. *1/83.*

● **Choplifter.** Gorlin. Fly your chopper to rescue 64 hostages, avoiding interceptor jets, homing mines, and tanks. Challenging, realistic, and playful. Stunning graphics. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *7/82.*

● **Crossfire.** Sullivan. Aliens come at you from four directions on a grid laid out like city blocks. Strategy and intense concentration required. Superb, smooth animation of a dozen pieces simultaneously. One of the great ones. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95. *1/82.*

● **Epoch.** Miller. Superbly stylized animation enhances this filmic shoot-'em-up. Tremendous sense of being in space; neat classical music and dramatic time-warp sequences. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *10/81.*

Frogger. Lubeck. Not even close. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34.95. *12/82.*

● **Gorgon.** Nasir. Fly over planet shooting and dodging invaders and saving kidnapped inhabitants. Outstanding hi-res graphics, challenging refueling sequence. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *8/81.*

Hard Hat Mack. Abbott, Alexander. Poor Mack. He must avoid vandals, inspectors, falling rivets, and hungry cement mixers to complete his building. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $35. *7/83.*

Jump Jet. Benton. Twenty tons of thrust separate you from torpedoes, submarines, and kamikaze planes. Vanquish all to recapture your island. Avant-Garde Creations, Box 30160, Eugene, OR 97403. $29.95. *8/83.*

✓ **The Last Gladiator.** Field. Gross me out, like totally. Snakes, spiders, bats, lizards, octopi, vampires, and you, the gladiator. Good but grody. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $35.

Lode Runner. Smith. 150 unique levels in super run-climb-dig-jump game—or design your own puzzles, scenes, and setups—in quest to retrieve stolen gold from the Bungeling Empire. Use monkey bars, trap doors, and ladders to your advantage. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *8/83.*

● **Meteoroids (Asteroids) in Space.** Wallace. Make little asteroids out of big ones, plus occasional hostile alien ships. Hyperspace, autobrake, autofire. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $19.95.

● **Microsoft Decathlon** (formerly *Olympic Decathlon*). Smith. Ten standard decathlon events. Hi-res animated athletes, muscle-stirring music; you provide the sweat. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $29.95. *6/81.*

Miner 2049er. Livesay, Hogue. Run, jump, climb, and slide through the mines, reinforcing the groundwork along the way. Elevators, cannons, chutes, and ladders help; mutants don't. Hot stuff, best of the genre. Micro Lab, 2699 Skokie Valley Rd., Highland Park, IL 60035. $39.95. *1/83.*

Mission: Escape. Schumann. Your mission, should you choose to accept it, is to rescue the Tweenies from the twelve planets of the Appel System. Armed only with short-range torpedoes, you must pilot a shuttlecraft through an asteroid belt and return the Tweenies to the mothership. Got it, Jim? MicroSparc, 10 Lewis St., Lincoln, MA 01773. $29.95.

Pinball Construction Set. Budge. Design and play your own computer games on-screen, with zero programming. A miracle of rare device. Superior. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $39.95. *2/83.*

● **Pool 1.5.** Hoffman, St. Germain, Morock. Makes most shots you could on a real pool table, with the advantages of instant replay and slow motion. Four different games. IDSI, Box 1658, Las Cruces, NM 88004. $34.95. *6/81.*

● **Raster Blaster.** Budge. First realistic pinball game. *Softalk* readers' Most Popular Program of 1981. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $29.95. *5/81.*

✓ **Round About.** Gumby Bitworks. Your ship can move along all sides of screen in highly animated alien blaster. Enemies ram instead of shoot. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95. *9/83.*

Sammy Lightfoot. Schwader. Sammy must dodge a variety of obstacles as he tries out for the circus. He evidently used to be a miner. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95.

Sigma 7. Agranat. As leader of the Sigmonian race, you defend your planet against seven levels of marauding aliens. Bandinelli Software, 1206 Caddo Dr., Opelousas, LA 70570. $19.95.

Snack Attack. Illowsky. Three-maze eat-'em-up; starts at any of five speed levels. Nonfattening. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95. *1/82.*

● **Sneakers.** Turmell. Many-layered shooting game; one of the best. Stomping sneakers and other creatures requires varying techniques. Fun. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *9/81.*

✓ **Spartan & Galactic Gliders.** Brodersen, Warner. Two games in one package. In *Spartan*, slay dangerous sea creatures to recover lost diamonds, and in *Galactic Gliders*, brave meteors and a space brick to find origin of the Glider family. Micro Arcade Software, 5809 Scenic Dr., Minnetonka, MN 55343. $34.95.

Spy's Demise. Zeldin, Hardy. Be the first on your block to run a maze of pile-driving elevators. Fast, frustrating fun. Complete puzzle after all nine levels. Penguin, 830 4th Ave., Geneva, IL 60134. $29.95. *11/82.*

Stellar 7. Slye. It's you against the Arcturan world in excellent 3-D animated arcader. Seven levels, 14 types of enemies to blast in quest of the alien armada. Software Entertainment, 537 Willamette St., Eugene, OR 97401. $34.95. *9/83.*

● **Super Invader.** Hata. Progenitor of home arcades. Still good hi-res, still a challenge. *Softalk* readers' Most Popular Program of 1978-80. Astar International, through California Pacific, 757 Russell Blvd., Davis, CA 95616, and Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07960. $19.95.

Wavy Navy. McAuley. Galaxy shooting game brought down to sea level in bright, cartoon-style hi-res. No aliens raining on player's patrol boat; just kamikaze pilots, bombers, and missiles. Shoot them, or it's "P.T. blown home." Good, fun game. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *2/83.*

● **Wayout.** Exciting 3-D maze that moves in perspective as you play. Map displayed at all times. Lots of angles and cleptangles. Separate version for IIe. Exquisite motion animation is a breakthrough. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *10/82.*

Zaxxon. Garcia. 3-D scrolling air raid brought to the Apple with little sacrifice in playability. Datasoft, 16606 Schoenborn St., Sepulveda, CA 91348. $39.95. *9/83.*

Home Education

Algebra 1-4. Sets of learning units progressing from algebraic rules to definitions to graphing and inequalities. Individualized teaching styles to fit everyone's needs. Good for adults wanting to overcome math anxiety as well as for schoolkids. Edu-Ware, Box 22222, Agoura, CA 91301. $39.95 each. *Algebra I, 5/81.*

✓ **Algebra 5-6.** For use after *Algebra 1* through *Algebra 4*, this set completes equivalent of a first-year course. Edu-Ware, Box 22222, Agoura, CA 91301. $49.95.

Apple Logo. Papert. Custom version (by its inventor) of turtle graphics language. First-rate educational tool. Great kid-friendly documentation. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Arcademic Skill Builders in Math. Chafin, Maxwell. *Alien Addition*, *Alligator Mix*, *Demolition Division*, *Dragon Mix*, *Meteor Multiplication*, and *Minus Mission*. Arcade action blended with addition, subtraction, multiplication, and division problems. Shooting correct answers to problems gets rid of pesky attackers. Choose speed, difficulty levels, game length. Developmental Learning Materials, 1 DLM Park, Allen, TX 75002. $29.95 each. *7/83.*

Basic Tutor. Robinson, Moreno, Courseware Ap-

plications. Basic tutorial for beginning programmer. Includes 120 page manual, six disks. SuperSoft, Box 1628, Champaign, IL 61820. $99.

Bumble Plot. Grimm. Colorful musical introduction to concepts of graphing and plotting. Teaches positive and negative numbers. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $39.95. *1/83*.

Cdex Training for the Apple IIe. Zunkel. Self-paced, graphically oriented training program. Cdex, 5050 El Camino Real, Los Altos, CA 94022. $59.95, three disks.

College Directions. Flanagan-Margolis, Gardner. Helps up to 20 students choose a college by exploring the features of more than 1,200 colleges. Assists students in developing a strategy for gaining admission. Systems Design Associates, 723 E. Kanawha Blvd., Charleston, WV 25301. $250.

Compu-Read. Set of programs develops speed and retention in reading. Stresses character and word recognition, comprehension. Edu-Ware, Box 22222, Agoura, CA 91301. $29.95.

Computerized Career Assessment and Planning Program. Hyre. Helps students determine their career options through an assessment of their interests and abilities, provides information on selected careers. Assists in developing and implementing career plans, includes more than 1,200 job titles. Systems Design Associates, 723 E. Kanawha Blvd., Charleston, WV 25301. $485.

Computer SAT. Prepares college-bound students for admittance test. Diagnoses strengths, weaknesses; creates study plan, exercises. Harcourt Brace Jovanovich, 1250 6th Ave., San Diego, CA 92101. $79.95.

Decimals. Master those elusive decimals. Eight programs including pre-test and learning units directed at conversion, addition, subtraction, rounding off, multiplication, division, and percentage. Edu-Ware, Box 22222, Agoura, CA 91301. $39.95.

Computer art by Joni Carter

Delta Drawing. Kids can make colorful drawings by using single-key commands. No special talent needed; this one develops programs that create complex graphics. Spinnaker, 215 1st St., Cambridge, MA 02142. $59.95. *11/82*.

Early Games for Young Children. Paulson. Basic training in numbers, letters, Apple keyboard for children ages two to seven with no adult supervision. Has a neat little drawing program. Counterpoint Software, Shelard Plaza N., #140, Minneapolis, MN 55426. $29.95. *11/82*.

Early Games Music. Paulson. Illustrates music with fun and theory. Children compose music and set to graphics or learn note reading and piano keyboard. Counterpoint Software, Shelard Plaza N., #140, Minneapolis, MN 55426. $29.95. *8/83*.

✓ **Early Games Piece of Cake.** Eyestone. Kids become baker's assistants; adding, multiplying, subtracting, dividing cakes. Includes CatchaCake, a problem-solving race against time to stop a cake from falling. Counterpoint Software, Shelard Plaza N., #140, Minneapolis, MN 55426. $29.95.

Ernie's Quiz. CTW. Four games, four subjects, one disk. Image recognition, counting skills, creativity, and Muppet expertise are introduced with lots of positive feedback. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83*.

Facemaker. DesignWare. Exercises kids' creativity and introduces programlike command sequencing as kids create faces and link them together in animated patterns. Spinnaker, 215 1st St., Cambridge, MA 02142. $34.95.

✓ **First Categories.** Wilson, Fox. Uses graphics, speech, text to teach six noun categories. Designed for beginning readers or handicapped. Laureate Learning Systems, 1 Mill St., Burlington, VT 05401. $120.

Fractions. Hi-res addition, subtraction, multiplication, and division of fractions. With learning manager system. Edu-Ware, Box 22222, Agoura, CA 91301. $49.

● **French Hangman, Latin Hangman, Spanish Hangman.** Protelsch, Earl. Hangman games that tell you the answer—in a foreign language. Interesting sentences, many formats. Addicting! George Earl, 1302 S. General McMullen, San Antonio, TX 78237. Two-sided disk, $29.95. *9/83*.

Game Show. Guess mystery words from clues given by "celebrity" partners—no threat to Liz Montgomery. Fifteen subjects cover vocabulary, history, algebra, and more. Add topics. Computer-Advanced Ideas, 1442A Walnut St., #341M, Berkeley, CA 94709. $39.

Gertrude's Secrets. Gertrude the Goose teaches four-to-nine-year-olds shape and color relationships. Solve logic puzzles, create forms. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $44.95. *2/83*.

Hey Diddle Diddle. Disharoon. Three reading and vocabulary games that strengthen reasoning ability. Ages 3 to 10. Spinnaker, 215 1st St., Cambridge, MA 02142. $29.95.

In Search of the Most Amazing Thing. Snyder. Role-playing game lets kids negotiate with aliens, fly hot-air balloon. Ages 10 to adult. Spinnaker, 215 1st St., Cambridge, MA 02142. $44.95. *7/83*.

Instant Zoo. CTW. Identify animals, test perception and reaction, match and decode words. Word editor lets you create your own word lists. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50.

Introduction to General Chemistry. Smith. Seven-disk tutorial with demonstrations and hi-res experiments covers subject matter from simple carbon chains to reactions of carboxylic acids. For college or advanced high school students. COMPress, Box 102, Wentworth, NH 03282. Each disk, $60; set, $350.

✓ **Jeepers Creatures.** Orelove, Hoffman, Prieboy. Mix and match animal parts, names to create catowlroos or normal animals. Gleeful fun for the very

young. Kangaroo, 332 S. Michigan Ave., #700, Chicago, IL 60604. $34.95. *9/83*.

✓ **Jenny of the Prairie.** Stott, Ewell. Adventure designed specifically for girls ages 7 through 12 involves a pioneer girl who gets separated from her family and must survive a winter alone. Rhiannon Computer Games for Girls, 3717 Titan Dr., Richmond, VA 23225. $34.95. *9/83*.

Kindercomp. Learning exercises for ages 3 through 8. Spinnaker, 215 1st St., Cambridge, MA 02142. $29.95.

Master Match. Robbins. Matching game with a TV quiz show format. Designed to enhance memory, teach vocabulary and concepts. For one to two players. Additional subject disks include: *Basic Skills, Science and Math*, *Math and Social Studies*, and foreign language. Computer-Advanced Ideas, 1442-A Walnut St., #341, Berkeley, CA 94709. $39.95; additional subject disks, $19.95.

● **MasterType.** Zweig. Learn to type by playing a game; simple and ingenious. IIe version teaches new keyboard. Lightning, Box 11725, Palo Alto, CA 94306. $39.95. *4/81*.

Micro Typing II. Engel. No alien blasting allowed. Drill, practice to your own paragraphs. Gives feel of word processor. Hayden, 600 Suffolk St., Lowell, MA 01853. $29.95.

Mix and Match. CTW. Create mixed-up Muppets and teach the Apple about animals. Logic and word-guessing games. Add your own word lists. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83*.

Money Manager. Chap, Sidewater. Personal finance simulation for elementary or secondary school children teaches good financial management. Can also be played as an educational strategy game. Computer Age Education, Box 6227, Washington, DC 20015. $29.95.

Moptown. Two appealing and educational games require children to arrange Moppet characters in imaginary Moptown. *Moptown Parade* teaches logic, strategy development, and pattern recognition for ages 6 to 10. *Moptown Hotel* teaches use of analogies, strategic thinking, and sequential reasoning for ages 9 and up. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $39.95 each.

Multiploy. Coletta. From answer base, blast menacing arithmetic problems out of the sky. Ranks and scores kept for tracking progress. Reston Publishing, 11480 Sunset Hills Rd., Reston, VA 22090. $19.95. *10/82*.

My First Words. Introduces preschoolers to beginning reading. Includes instructions on keyboard use. Encyclopaedia Britannica Educational Corporation, 400 S. Edward St., Mt. Prospect, IL 60057. $34.95.

● **The New Step by Step.** Software and audio tape team up to teach Basic programming painlessly. Graphics, animation, sound effects, and workbook. Superior. Program Design, 11 Idar Ct., Greenwich, CT 06830. $79.95. *7/82*.

On Becoming a Hero. Nidorf. Nonjudgmental program for teenagers helps them evaluate their value system, decide what kind of person they are and what kind of person they want to be. Psychological Psoftware, 4757 Sun Valley Rd., Del Mar, CA 92014. $29.50.

PFS: School Record Keeper. Larson. Thirty different forms and reports to aid school administrators in student record management, equipment management, budget control, and room and events scheduling. *PFS: Report* and *PFS: File* required. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $150.

Plato Decimals. Arcade-style decimal tutorial that automatically adjusts difficulty to child's performance. For elementary math students. Control Data, Box 261127, San Diego, CA 92126. $45.

Plato Fractions. Correct use of fractions breaks balloons in elementary school-level tutorial. Features automatic adjustment of difficulty level. Control Data, Box 261127, San Diego, CA 92126. $45.

Rocky's Boots. Robinett, Grimm. Rascally racoon helps children build logical thinking and computer understanding. Construct machines of logical gates in convolutions of thickening complexity. Music and sound effects add to fun. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $49.95. *2/83*.

SAT English I. Designed to help high school students prepare for college entrance exam. Covers verbal half of test; learn by mistakes. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $30. *11/81*.

SAT Word Attack Skills. Priven. Teaches college-bound students testing skills, vocabulary, and methods of deciphering unfamiliar words. Edu-Ware, Box 22222, Agoura, CA 91301. $49.

Snooper Troops. Snyder. Ongoing hi-res mystery series in form of educational games. Highly structured; excellent fourth-through-eighth-grade educational tool. Fun for adults too. Spinnaker, 215 1st St., Cambridge, MA 02142. $44.95 each. *9/82*.

Speed Reader II. Davidson, Eckert. Six-part reading program develops reading efficiency, tests reading rate, and provides 35 reading selections. Contains comprehension quizzes, editor for entering additional material. Davidson & Associates, 6069 Groveoak Pl., #12, Rancho Palos Verdes, CA 90274. Two disks, $69.95. *9/83*.

Spelling Builder. Victor. Unique set of eight programs and audio cassette teaches students and adults reasons behind spelling; overcomes spelling difficulties. Ideal for those who have mastered basic spelling but have trouble with tricky words. Superior. Program Design, 11 Idar Ct., Greenwich, CT 06830. $26.95. *5/81*.

Spotlight. CTW. Simple geometry for preteens. Games involve number estimation and angles of reflection. Good and fun. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50.

Square Pairs. Kleiman, Minsuk. Matching games for ages seven through twelve. Includes feature for creating your own games. Scholastic, 906 Sylvan Ave., Box 2010, Englewood Cliffs, NJ 07632. $39.95. *9/83*.

Step by Step Two. Introduces graduates of *The New Step by Step* to intermediate Basic programming. Teaches peek and poke, hexadecimal numbers, concatenations, and more. Program Design, 11 Idar Ct., Greenwich, CT 06830. $89.95. *7/83*.

Stickybear. Hefter, Worthington, Rice, Howe. Animated early education programs. In *Stickybear ABC*, moving pictures with sound represent letters. In *Stickybear Numbers*, groups of moving objects teach numbers and simple arithmetic. Ages three through six. In *Stickybear Bop*, ducks, planets, and balloons bop across screen in three shooting galleries. For all ages. Xerox Education/Weekly Reader, 245 Long Hill Rd., Middletown, CT 06457. $39.95 each. *5/83*.

Story Machine. Helps develop positive attitude toward writing and ability to write correctly. Words come to life when sentence is acted out on-screen. Kids five to nine love to type "The tree ran down the street" and see it do so. Spinnaker, 215 1st St., Cambridge, MA 02142. $34.95.

✓ **Super Speed Reading.** Carpet. Exquisitely clear, logically organized. Classic speed reading method brought faithfully to computer. Integrates 120 computer text pages with books. Keeps time, saves progress record. Magnum, 21115 Devonshire St., #337, Chatsworth, CA 91311. $149. *9/83*.

Terrapin Logo. MIT. The Logo language, using a Terrapin turtle to teach state, control, and recursion. Terrapin Inc., 380C Green St., Cambridge, MA 02139. $149.95.

✓ **Troeger Math Placement Guide.** Troeger. Enables teachers to administer math placement tests

without paperwork. Seven levels of testing, automatic level advance. Merit Audio Visual, Box 392, New York, NY 10024. $59. *9/83.*

Type Attack. Hauser. Learn to type while defending the planet Lexicon from invaders. IIe version teaches IIe keyboard. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95.

Typing Tutor. Ainsworth, Baker. Four levels of proficiency; individualized drills created with time-response monitoring. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $24.95.

Strategy

Thinking, planning, plotting games, from war games to backgammon to cards.

AirSim-1. Machine language flight simulator with six landing fields and optional instrument flying mode. Mind Systems, Box 506, Northampton, MA 01061. $40.

✓ **Broadsides.** Garris. Re-creates famous naval battles from the days of sail. Plays in either arcade or strategy mode. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95.

Casino. Five hi-res games, Vegas style: blackjack, baccarat, keno, poker, and roulette. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95. *10/82.*

● **Castle Wolfenstein.** Warner. First game to fuse successfully strategy, home-arcade, fantasy. Escape from Nazi stronghold with secret plans. Room layout changes with each new game. Enemy speaks (in German). Muse, 347 N. Charles St., Baltimore, MD 21201. $29.95. *10/81.*

● **Computer Ambush.** Williger. Gutty soldier-to-soldier street fighting in World War II France. Latest version is 40 times faster than the original, which was one of best games ever created for Apple, except for slowness. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95.

● **Computer Baseball.** Merrow, Avery. Simulates individual player abilities from the teams of 13 famous World Series. Enter and play teams of your own creation. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95. *9/81.*

Cosmic Balance II. Murray. Richly detailed simulation of strategic operations in an interstellar culture. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95. *9/83.*

✓ **Eagles.** Raymond. World War I aviators climb, dive, shoot, run for home in historic aircraft. Be either German or Allied ace. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95.

● **Flight Simulator.** Artwick. Uses aerodynamic equations, airfoil characteristics for realistic take-off, flight, and landing. Two years on Top Thirty. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $33.50.

Geopolitique 1990. Ketchledge, Billings. Diplomatic, economic, and military simulation that pits the United States against the Soviet Union in a struggle for world supremacy. Features two phases: global diplomacy and geowar, a simulation of non-nuclear combat. For one player. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95.

Germany 1985. Keating. NATO forces tangle with Soviet troops in West Germany in the first act of SSI's *When Superpowers Collide* saga—accompanied by *RDF 1985* and *Baltic 1985.* Includes rule-book necessary for play of the other acts. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95. Others, $34.95. *4/83.*

Gin Rummy. Carpet. Play against computer. Hi-res hand can be arranged. Knocking allowed. Computer plays pretty well. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95. *6/82.*

Go. Erwin. Classic Oriental territory game in hi-res. Surround your opponents before they surround you. Play in solitaire or bihuman mode. Hayden, 600 Suffolk St., Lowell, MA 01853. $34.95.

Hi-Res Computer Golf 2. A masterpiece; requires judgment, strategy, and visual acuity. One of the few computer sports simulations that require dexterity. Avant-Garde, Box 30160, Eugene, OR 97403. $34.95. *6/83.*

Microbe. Clardy, Zalta. Graphic tour de force that requires shrewd deduction and quick reflexes. Player takes a fantastic voyage inside patient's body in attempt to save him from death. Medically accurate and educational, for one to ten players. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $44.95. *6/83.*

● **Microgammon II.** Program for play, practice, improvement of backgammon skills. Pretty good competition. Softape, 5547 Satsuma Ave., North Hollywood, CA 91601. $19.95. *2/81.*

North Atlantic '86. Grigsby. The Soviet Union has seized Europe. NATO has retreated to Iceland. Desperate land-sea-air strategy for one or two players. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95. *9/83.*

✓ **Oil Barons.** Glass. Live out your J.R. fantasies on game board and disk. For one to eight players. Epyx/Automated Simulations, 1043 Kiel Ct., Sunnyvale, CA 94086. $100.

Old Ironsides. Rice, Hefter. Delightful program provides simple but excellent hi-res simulation of thundering ship-to-ship combat. Package includes poster and logbook. Xerox Education Publications, 245 Long Hill Rd., Middletown, CT 06058. $39.95. *5/83.*

● **Pensate.** Besnard. Chess-type thinking game with new tactics. Computer's many pieces move in relation to player's piece; each of 10 types of computer pieces has unique rules. Makes full use of computer capabilities. Intriguing, progressive, and addictive. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95. *7/83.*

Program X, the Ultimate Puzzle. Gips. Extremely challenging cryptography in brain teaser that lives up to its name. National Software, Box 686, Dover, MA 02030. $29.

Rendezvous. Huntress. Space-shuttle simulation in 3-D, created by a senior scientist at JPL. Orbit Earth, match orbit, and dock with space station. Authentic, demanding. Edu-Ware, Box 22222, Agoura, CA 91301. $39.95. *7/82.*

✓ **Ringside Seat.** Saracini. Who really was the greatest? Find out by managing matches between Joe Louis and Rocky Marciano, or Muhammed Ali and Jack Dempsey, among others. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95.

● **RobotWar.** Warner. Strategy game with battling robots is great teaching device for programming. Muse, 347 N. Charles St., Baltimore, MD 21201. $39.95. *1/81.*

● **Sargon II.** Spracklen, Spracklen. Computer chess game with seven levels of play. Hayden, 600 Suffolk St., Lowell, MA 01853. $34.95.

✓ **Space Station Zulu.** Shields. The movie *Alien* married to a tactical combat game. Not bad, but suffers by comparison to similar siblings. Avalon

The Apple IIe has always been great.

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Hill, 4517 Harford Rd., Baltimore, MD 21214. $25. *9/83*.
Space Vikings. Robbins. 3-D simulation of space combat. Raid the planets of twenty star systems, gathering loot and establishing bases. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $49.95.
Spitfire Simulator. Air flight simulator—Spitfire in combat with German aces—with 3-D scenery and moving target aircraft. Mind Systems, Box 506, Northampton, MA 01061. $40. *12/82*.

Utility

Apple-Cillin. Hardware diagnostic tests for all RAM and ROM, plug-in cards, cp registers, disks; nine video test patterns. XPS, 323 York Rd., Carlisle, PA 17013. $49.95.
Apple Mechanic. Kersey. Multiple disk utility with shape editor, custom typefonts, byte rewriter, and tricks to facilitate music, text, and hi-res generation. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50. *9/82*.
Apple Mechanic Typefaces. Twenty-six new fonts for use with *Apple Mechanic*. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $20.
Apple Pascal. Structured operating system featuring enhancements of color graphics, sound generation, and Apple's I/O features. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $495.
✓ **The Assembler.** Floeter. Machine language assembler that understands Basic, generates machine language code from Basic commands. Includes line editor. When used with *MacroSoft*, a library of routines, system acts as a complete high-level language. MicroSparc, 10 Lewis St., Lincoln, MA 01773. *The Assembler*, $69.95; *MacroSoft*, $49.95; both, $99.95. *9/83*.
Audex. Collection of utilities to create, edit, and play back sounds, in Basic and assembly language. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.
Bag of Tricks. Worth, Lechner. Four utility programs for dumping and examining raw tracks, sector editing, reformatting tracks, and repairing damaged catalogs. Indispensable. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $39.95. *6/82*.
Beagle Basic. Simonsen. Allows you to enhance and customize Applesoft by adding up to 12 functions. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $34.95.
Bug Byter. Screen-oriented mnemonic debugging tool with resident assembler and disassembler. Displays contents of accumulator, X and Y registers. Computer-Advanced Ideas, 1442A Walnut St., #431, Berkeley, CA 94709. $47.50. *3/83*.
DOS Boss. Kersey, Cassidy. Utility to change DOS commands; customize catalog. Good ideas and witty presentation. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $24. *10/81*.
DOS 3.3. Increases disk storage capacity more than 20 percent over 3.2. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. $60.
DOS Tool Kit. Excellent utility package; Apple II assembler-editor system and Applesoft toolkit. Edit, assemble machine language programs; write, edit Basic programs. Simplifies graphics, includes character generator. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $75. *10/81*
Double-Take. Simonsen. Multiple-utility features two-way scrolling for catalogs, hex/ASCII dumps. Improved list format. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $34.95.
Einstein Compiler. Goodrow, Einstein. Translates Applesoft programs into machine language for run-time up to 20 times faster. Supports all graphics modes, defined functions, and DOS commands. Einstein, 11340 W. Olympic Blvd., Los Angeles, CA 90064. $129. *5/83*.
Flex Text. Simonsen. Adds graphics to text and vice versa; prints variable-width text with no hardware. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.
Font Downloader and Editor. Kovacs. Enhancement for the Apple Dot Matrix Printer that enables a user to teach printer new fonts and load them into RAM. Can switch back and forth from custom to regular styles, allows creation of diagrams, new typefaces. Micro-Ware, 1342 B Route 23, Butler, NJ 07405. $39.95.
Frame-Up. Weishaar. High-speed display utility generates professional presentations of graphics, text frames. Text screen editor lets you create text slides, add type live during shows. Optional preprogrammed display for unattended shows. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.
✓ **GALE.** Mossberg. Global Applesoft line editor lets single key stand for long programming commands, renumbers program lines, merges, finds, deletes. MicroSparc, 10 Lewis St., Lincoln, MA 01773. $39.95.
● **Global Program Line Editor.** Enhanced version of *Program Line Editor* with programmable cursor and listing control. Edit line by line or by range of lines and search for strings. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $60. *12/82*.
Merlin. Does assembly language programming with a dozen editing commands and 28 pseudo-ops. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $64.95. *1/83*.
Programmer's Workshop. Sixty general-purpose subroutines to integrate into Basic programs. Includes variety of visual and sound effects, math utilities, sorting, input/output subroutines, and screen controls. Hayden Software, 600 Suffolk St., Lowell, MA 08153. $49.95.
ProntoDOS. Weishaar. High-speed disk utility cuts about two-thirds of the time off bload and save functions. Compatible with all DOS commands; frees up to 15 extra sectors per disk. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.
✓ **Ramdisk IIe.** Kraemer. High-speed pseudo-DOS for 64K RAM. Large amounts of storage for the price. Precision, 6514 N. Fresno St., Milwaukee, WI 53224. $19.95. *9/83*.
Sphinx. Software giving single-pass encryption beyond 10 to the 400th power. Crane Hill, Box 273, Gonzalez, FL 32560. $37.50.
● **Super Disk Copy III.** Hartley. Easy-to-use menu-driven software utility; correct file sizes, undelete, free DOS tracks, more. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48003. $30. *10/81*.
Tip Disk #1. Kersey. One hundred *Beagle Tip Book* programs on disk. Includes Apple command chart and peeks/pokes chart. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $20.
Utility City. Kersey. Twenty-one utilities on one disk. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

Word Processing

Apple Writer II and IIe. Includes WPL (word processing language). Additional functions menu; continuing features and functions menu; continuous readout of characters and length. *IIe* has shift, shift-lock, and tab, four-arrow cursor control, and delete key; data files compatible with *II*. Apple, 20525 Mariani Ave., Cupertino, CA 95014. *II*, $150; *IIe*, $195.
Apple Writer II Preboot. Armstrong, Borgorsen. Allows you to run *Apple Writer II* in 80-column format with the Videoterm 80-column card. Videx, 897 N.W. Grant Ave., Corvallis, OR 97330. $19.
Bank Street Writer. Kusmiak, Bank Street College of Education. Designed for use by whole family. Universal search and replace, word wrap are stan-

dard. U/lc without hardware. On-disk tutorial. Takes advantage of memory, keyboard on IIe, if you have one. Broderbund, 1938 4th St., San Rafael, CA 94901. $69.95. *2/83*.

Format-II, Enhanced Version. Hardwick, Beckmann. Word processor supports all popular 80-column cards, stores up to 50 pages of text on one disk. Includes single keystroke editor, mailing list database; displays text on-screen exactly as it will print out. Compatible with hard disk drives. Kensington Microware, 919 3rd Ave., New York, NY 10022. $150.

Magic Window II. Forty, 70 (in hi-res), or 80 columns in this expanded version. Compatible with Pascal 80-column. With user-tailored, fast menu; underlining; global search and replace. IIe version uses all 64K, more if you have it. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95.

MegaWriter. Gives 80-column page without 80-column card, prints in boldface, underlines via menu; features mail list merge, find, replace, text block move. Written in Pascal. Requires 64K. Megahaus, 5703 Oberlin Dr., San Diego, CA 92121. $59.95. *8/83*.

ScreenWriter II. Kidwell, Schmoyer. No extra hardware for u/lc, 70-column display, printer spooling. Edits Basic, text, and binary files; complete search and replace. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $129.95. *1/83*.

● **Sensible Speller.** Hartley. Spell-checking program sports listable 85,000 words, extensible up to 110,000 words. Recognizes contractions, gives word counts, word incidence, number of unique words. Clear documentation and simplicity of operation. Works with many word processors' files. Best of breed. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $125. *11/82*.

Super-Text Professional (40/80). Automatic 80-column, u/lc on equipped IIe; with appropriate equipment on II Plus. On-screen formatting and help reference guides. Muse, 347 N. Charles St., Baltimore, MD 21201. $99. *12/82*.

Word Handler II. Elekman. Simple program with straightforward documentation. Allows folded paper printout for two-sided printing. 80-column with the IIe. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $199. *11/82*.

✓ **Word Juggler IIe.** Gill. Sophisticated word processor with search, replace, and block move. Printout can be viewed on-screen prior to printing; multiple copies printed of selected pages. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $239.

WordStar. Screen-oriented, integrated word processing system in CP/M. Z-80. MicroPro, 33 San Pablo Ave., San Rafael, CA 94903. $495.

Zardax. Phillips. Highly recommended. Single program includes supersimple use of word processing features. Considerable extras including communication by modem. Good 80-column facility with board, automatic in IIe version. Computer Solutions, Box 397, Mount Gravatt, Queensland, Australia. In the U.S.: Action-Research Northwest, 11442 Marine View Dr. S.W., Seattle, WA 98146. $295. *Zip-Comm* modem program. $80. *11/82*.

Apple III

Access III. Communications program for timesharing and standalone tasks; gives access to remote information services, minis, and mainframes. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

Apple Business Basic. High-level structured programming language. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $125.

Apple III Business Graphics. BPS. General-purpose graphics program draws line graphs, bar

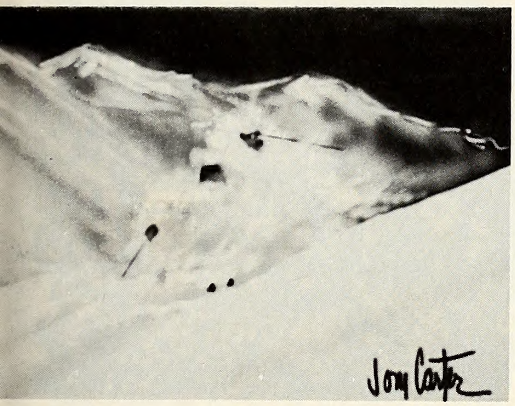
graphs in three formats, overlays, and pie charts in 16 colors. Continuous or discrete data; curve-fitting capabilities. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Apple III Pascal. Program preparer with editor, compiler, disassembler, linker, filer, system library. Features cursor control, text modeling, formatting. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $250.

Apple Writer III. Lutus. Uses WPL (word processing language) to automate text manipulation and document creation. Adjusts print format during printing; translates from typewriter shorthand to English or other language and back again. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $225.

Catalyst. Allows boot from hard disk; transfers all programs to ProFile. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $149.

BPI General Accounting. BPI Systems. Includes *General Ledger*, *Accounts Receivable*, *Accounts Payable*, and *Payroll*. Maintains customer, employee, and vendor files; prints customer statements, checks. Analyzes budget, compares historic information, keeps independent financial records for 99 different departments and locations. Provides password protection for each company, can be maintained on one disk. Requires 256K Apple III, ProFile hard disk. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. $495.



Hardisk Accounting Series, 2.0. General ledger, accounts receivable, and accounts payable handle 32,776 customers or accounts; inventory features five methods of evaluation. Also payroll, management analysis, and mailing labels. Great Plains, 123 N. 15th St., Fargo, ND 58102. $395 to $595 per module.

Inkwell. Wunderlich. Word processor prints documents as they appear on-screen, simulates typewriter or creates form letters from mailing list. Horizontal scrolling allows text up to 155 characters wide. Foxware Products, 2506 W. Midwest Dr., Taylorsville, UT 84118. $185.

Mail List Manager. Generates, stores, sorts, edits, and prints mailing list files. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

Micro/Terminal. Gives access to any in-house or remote database; set up and log only once. Built-in editor or edit off-line. Microcom, 1400-A Providence Hwy., Norwood, MA 02062. $99.95.

PFS:File. Page. Form-oriented information-management system stores and retrieves up to 32,000 entries. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175.

PFS:Graph. Chin, Hill. Works alone or interfaces with *PFS* databases and *VisiCalc* files. Produces bar, line, and pie charts, merging data from several sources. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175.

PFS:Report. Page. Generates reports; sorts, calculates, and manipulates data filed with *PFS:File*. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125.

Quick File III. Personal index card or filing system that generates reports, sorts. Fifteen fields; file as long as disk allows; can be put on ProFile. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $100.

State of the Art General Ledger and **Business Modules.** Standalone interfaceable modules for 12 accounting periods. Includes *General Ledger*, *Accounts Receivable*, *Accounts Payable*, *Payroll*, *Inventory Control* ($595 each), *Sales Invoicing*, *Budget and Financial Reporting* ($495 each), and *Professional Time and Billing*, $795. State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626.

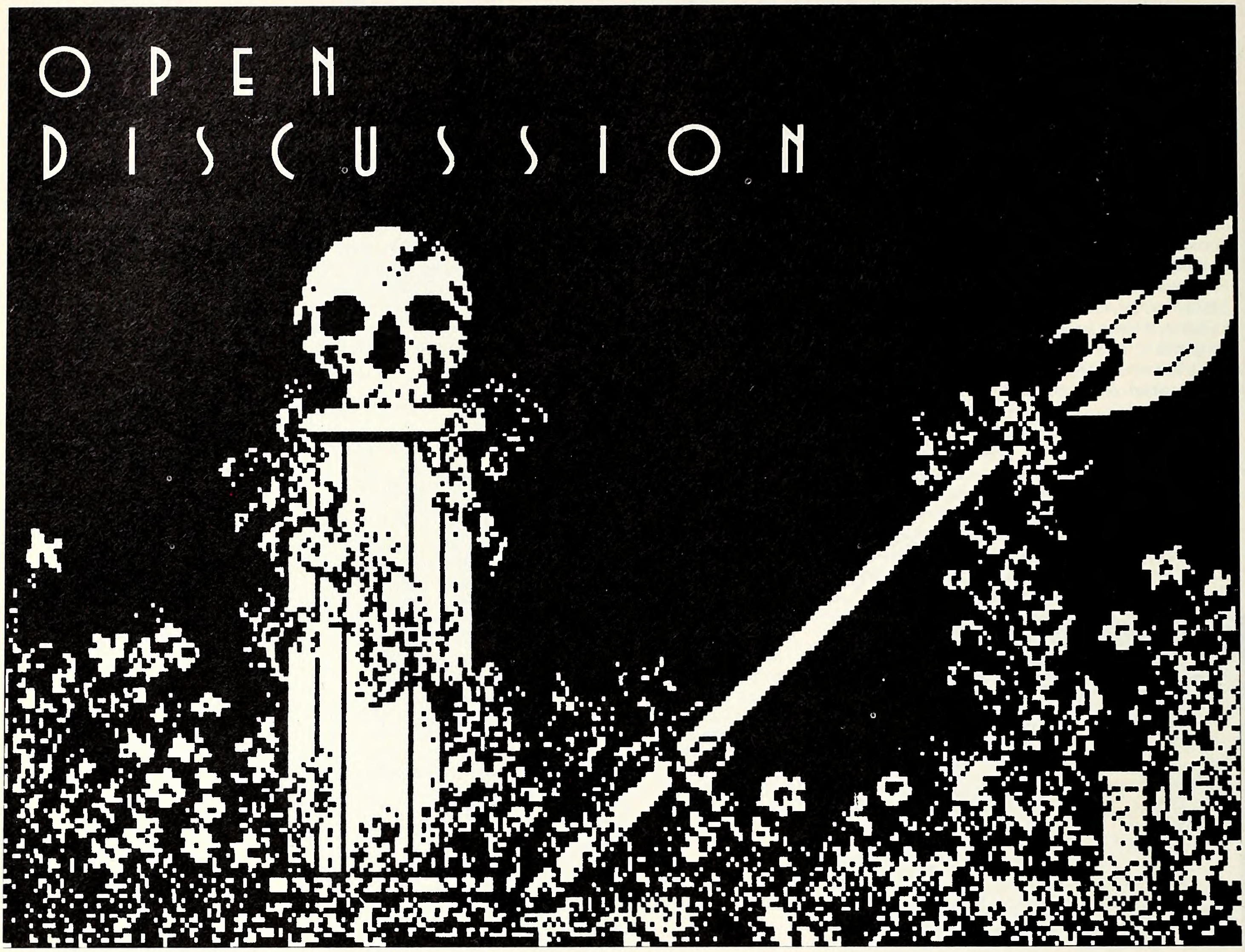
VersaForm. Landau. State-of-the art business-forms processor. Does invoicing, purchasing orders, mailing lists, client billing. Powerful, complex, worth getting to know. Hard-disk-compatible. Applied Software Technology, 14128 Capri Dr., Los Gatos, CA 95030. $495. *8/82*.

VisiCalc Advanced Version. For corporatewide modeling applications; develop sophisticated templates to be filled in by novice users. On-screen help, IRR and calendar functions, macro facility, variable column widths, locked cell values, and hidden cell contents. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $400.

VisiCalc III. Software Arts, Bricklin, Frankston. Just like it sounds; expanded memory, u/lc, 80 columns. Four-way cursor movement. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250.

VisiSchedule. Critical path PERT scheduler. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $300.

Word Juggler. Gill. Word processor uses expanded memory. Printout can be viewed on-screen prior to printing; multiple copies printed of selected pages. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $295. *12/82*.



Open Discussion gives you the chance to air your views and concerns, to seek answers to questions, to offer solutions or helpful suggestions, and to develop a rapport with other readers. It's what you make it, so share your thoughts, typed or printed, and double-spaced (please), in Softalk*'s Open Discussion, Box 60, North Hollywood, CA 91603. To ensure the inclusion of as many contributions as possible, letters may be condensed and edited.*

Boo! This month artist Cecilia Ziemer Watson must have really been in the Halloween spirit when she created the picture above, using the Utopia *graphics package by Todd Rundgren with the Apple Graphics Tablet. The end of Open Discussion may be haunted, so don't be too spooked if four hobgoblins jump out and scare you!*

Out of the Closets

I have been an Apple owner since 1978 and have always enjoyed going up to my study after dinner, when the kids were on their way to bed (or at least to their rooms), and pursuing my favorite hobby of computing. Over the years, I gradually added peripherals, books, and magazines, until my study bristled with evidence of my hobby. Having young children, and being wise to their destructive ways, I even locked the study from the outside so no one could enter. It worked! No one entered, except me. The room took on an aura of a sanctum, very quiet and also very lonely. This process occurred slowly but inexorably. My children began to express interest in the machine and were allowed to touch it only under direct supervision by me. Clearly something had to be done to reintegrate the household.

Recently, I acquired an Apple IIe and took it up to the holy room to sit by its older brother. The problem was that there was no room for the new arrival at all. That did it! I brought the whole mess downstairs to our unlived-in living room and, in an afternoon when the kids were away, rewired everything and set up both Apples on a big table in the living room.

Don't worry, I said to my wife, they will learn to use them and not abuse them. For once I was right! The children have laid claim to the Apple II, have learned to turn it on, boot disks at will, play games to their hearts' delight, and to regard it as fun. (They are too young to use it for problem-solving yet.) No catastrophe has occurred, the only spill has been my coffee, and the living room is living up to its designated name. Other added benefits have been the gaining of an additional room and the addition of my wife, a former computer widow, to the fraternity (sorority?) of computer users. I don't know how many others have had an experience similar to mine, but the contrast in our home has been considerable and markedly positive. I don't know the long-term effects on our children, but the short-term effects on all of us have been beneficial. So to all of you with Apples, kids, and patient wives—get the Apples out of the closets and into the living rooms.

Frederick M. Gise, Wagoner, OK

A Worthwhile Journey

After long deliberation and agonizing, I finally bit the bullet and bought an Apple II Plus. On that fateful day I knew I had gotten a good buy, even though it meant a sixty-mile drive. What a long trip, but what a happy day when we brought our Apple home.

Little did we know at the time what a marvelous deal we had gotten. Not only did we get the best price on the computer we wanted, but we got the best salesperson. Barbara Purcell, manager of Media Pack in Clarksburg, West Virginia, sold us our Apple II Plus, but there was much more to the transaction than just an exchange of money for equipment. There was courtesy to me and, more important, to my two sons. I say that because so many salespeople fail to recognize someone under eighteen as a person with knowledge and discretion. Ms. Purcell treated all of us with the utmost dignity and has continued to do so. It is worth the sixty-mile trip just to get something as minute as a cartridge ribbon for our printer, and we can get those in the town where we live!

On behalf of myself and my two sons, Joseph and Benjamin Pezzillo, I would like to thank Media Pack and Apple for having such a fine person in Clarksburg.
Caroline M. Carpenter, Morgantown, WV

Those Sneaky Paddles
We recently ran into a situation that could be of interest to other IIe owners. The other night we were debugging an assembly language program and had to turn off the computer because it had "locked up." When we turned it back on, the Apple was putting stuff on the screen. If we pressed any keys, it played some tones. It wouldn't boot. We turned it off and on several times only to have the same thing occur.

We're not new users. Our Apple II is nearly five years old now, so we've seen a few hardware troubles in our lives. We eventually popped the top and pushed on all the chips and cards to make sure everything was making good connection, but we saw no improvement. We sat back, in anger and frustration. It was after midnight, on a weekend, and we had a pile of work to get in the mail Monday morning. We thought about what we were seeing. It appeared that the Apple was running its built-in RAM test. Normally this is invoked by pressing the closed-apple key when you turn on the computer. Nothing was touching that key, but it seemed possible that the key had gone out. However, the closed-apple key is the same as button 1 on the paddles. After a little searching we found our paddles buried under a pile of papers and reference books. We turned on our Apple and it booted fine. The weight of the papers was enough to press down button 1 so that, as far as the Apple knew, it looked like the closed-apple key was being pressed.

Moral of the story: Never trust a game paddle that's unseen; it may be conspiring with your Apple IIe to prevent you from rebooting. Here's another thought if your IIe still insists on checking itself. Disconnect your game paddles or joystick to make sure it hasn't gone flaky. It might save you a trip down to the shop and several days without your Apple, not to mention the dollars to have it checked out.
Valerie A. Floeter, Milwaukee, WI

A Hardware Star
I would like to say a few words about Hollywood Hardware and its Ultra ROM Board. I bought the board a couple of months ago and have had several subsequent dealings with the company. The board is better than I expected! It has vast capabilities and has made my programming and editing a lot easier. The people at Hollywood Hardware have been extremely helpful and eager to back up their product. I have no reservations about recommending this company and its product.
M. Steven Cook, Anderson, SC

Words and Toys
A few weeks ago, I bought the *Proofreader* and *Thesaurus* from Aspen Software in Tijeras, New Mexico. I couldn't be more pleased with these two pieces of *WordStar*-compatible software. At least *I* use them with *WordStar*. Before receiving these two pieces of software, I thought that *WordStar* was the most wonderful

piece of stuff available. Not so now, although it runs a close second. I say second, because as far as I am concerned, both of these Aspen products tie for first. I don't know which I like better.

The *Proofreader* replaces *SpellStar* and does so with extreme grace. The simplicity of use, as well as the ease with which one can update the main dictionary, makes this the ideal spelling correction system. Not only does it show you the word that it doesn't recognize, it shows you (if you want) a list of possible correct spellings for the word—those words that are nearest to it alphabetically. The dictionary is over 100K, so if a person does not have a high-density disk storage system or a hard disk, it may be a little unwieldy. I guess that problem could be corrected with multiple drives, but I have a Microsci A70 double-density drive; so all of it fits on just one side of one disk for me.

On the other side of the same disk, I have the *Thesaurus*. I'm not sure just how many words it has, but it has plenty for me and is extremely easy to use. You simply place the cursor on the word that you're not pleased with and, while editing your text, press the escape key twice. At the top of the screen a list of possible replacement words will appear. Then, when you've decided which word you want to use, you move the cursor to that word and press a key. Voila, it automatically replaces the word in the text with the new word chosen. After that, you simply rejustify the paragraph if the length of the line changed.

Both of these products have my vote for best word processing software of the year, and I think the person who wrote these programs ought to be given the Nobel Peace Prize, for bringing man and computer together in a friendly, warm atmosphere. Again, my congratulations to Aspen Software for its great success in writing these two programs.

A third product I recommend is the replacement keyboard from Executive Peripheral Systems. I have always felt that *WordStar* was a little extravagant with all those control keys. It is sometimes difficult to find the function I want, paging through the menus. This keyboard eliminates that problem for most of the frequently used commands. When you wish to use *WordStar*, you simply put the *WordStar* CP/M PROM into place under the lid of the keyboard and place the overlay over the user-function keys.

This keyboard is so handy and easy to use that my roommate (who has a very bad short-term memory and refused to use *WordStar* because he couldn't remember the commands) has started writing his own letters and now has the incentive to learn to use the computer. That's amazing! I could never get him to do it before.

The only other problem I have found with the board occurs when you change a PROM: You have to turn the computer off or disconnect the keyboard from the computer for a second. I may install an on/off switch to the keyboard to replace this inconvenience. The instruction manual says you can put the computer away, someplace where it is not in the way. But if you have to reach the computer to turn it on and off, how can this be done? I have a foot switch, fortunately, because of all of the plug-ins I need, but I don't like turning the whole thing off just to do a power-reset. Perhaps the manufacturer will take the hint and add the switch.
Jeffrey Stuart-Jones, West Hollywood, CA

Post-Mortem Replacement

I have just had a fabulous experience with Sirius Software that I would like to share. Quite a while ago I bought *Wayout* from Sirius. It is a superbly produced piece of software; the graphics are amazing. After I played it for an extremely long time, it died—probably from overuse. Two days ago, I sent the disk back to Sirius, requesting another copy and a replacement bill. Today I received it, and without a bill! Now that's what I call service.
Brett Juilly, San Mateo, CA

Among the Good

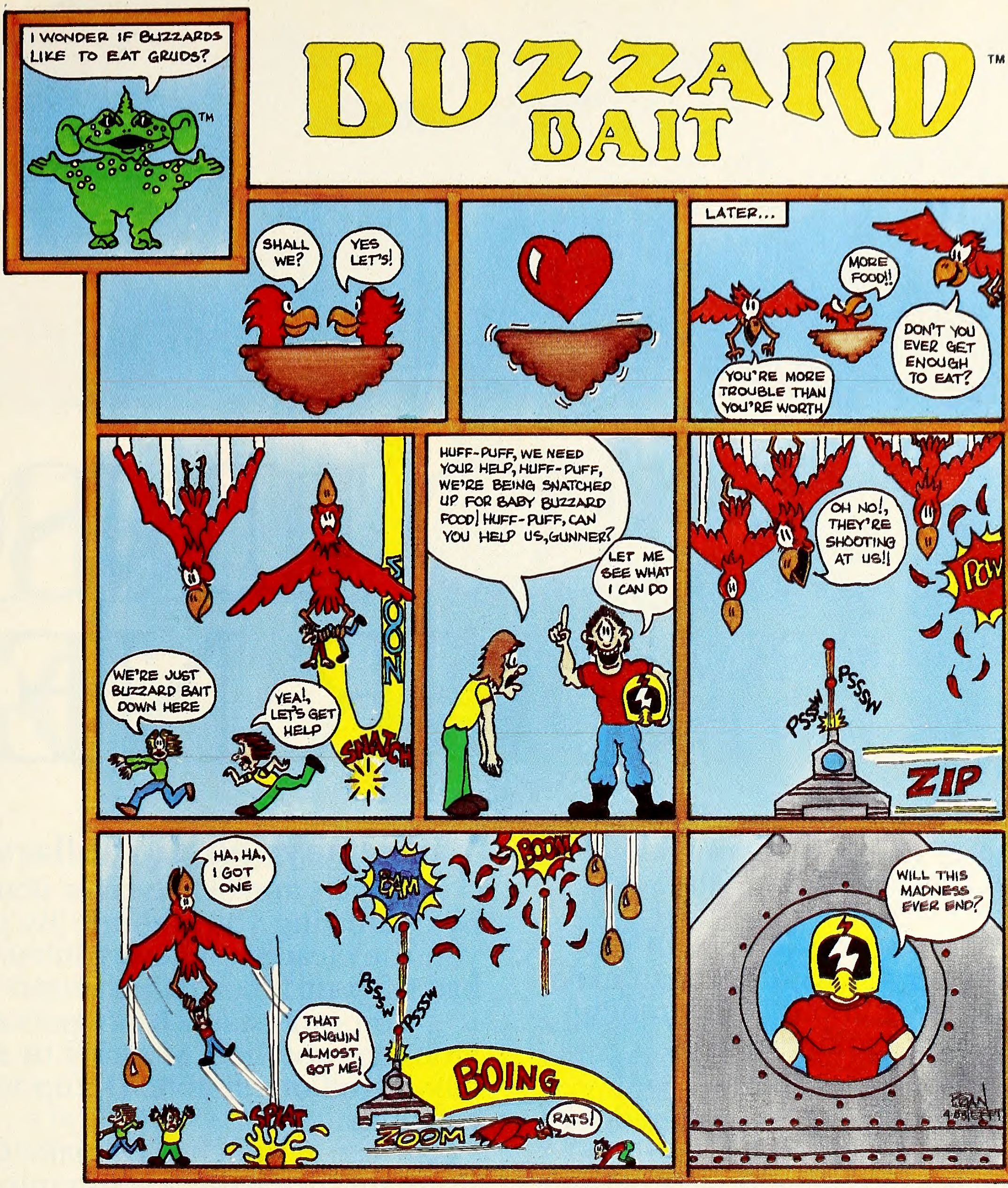
Several months ago I purchased a copy of *Screen Writer II* from a software mail-order house. Within a few weeks the package arrived. To my dismay, the very first page of the instruction manual advised that the enclosed disks were for use with Applesoft and that an Integer version of the package would be provided with the return of the two disks and registration card. I bit the bullet on this one, since I couldn't recall if the dealer had been informed as to the model of my Apple. I returned the disks directly to Sierra On-Line, since past experience had shown that living overseas is conducive to what I can describe only as "The Little Bo-Peep Syndrome"—that is, our mail packages always seem to "lose their way." In addition, at $12.85 a minute, a person thinks twice before he reaches out to touch someone via telephone. To me, an 800 toll-free number means three additional digits I must quickly attempt to enter before the phone lines go dead again.

Quicker than you could name the number of Apple look-alikes, I received a letter from Mary Fenton, product support manager at Sierra, advising me that a new set of disks had been mailed and that I should return my disks after receiving the replacements. In other words, I was given the opportunity to stay in business until the replacements arrived. (Now, if I only had an Apple II Plus in which to use the disks.)

The replacement disks worked perfectly from day one. Then came day two! For no apparent reason I couldn't get the editor part of the program to load. Again I wrote to Ms. Fenton and she said they would work on a fix. The fix turned out to be another set of replacement disks, not yet on the market from what I could tell, and a letter apologizing for any inconvenience I had suffered thus far. It is important to note that each letter from the company always reminded me of my option to obtain a full refund.

If you've been keeping count, that makes two different exchanges, at no additional cost, that have taken place up to this point. The story doesn't end here. Just recently I received another letter accompanied by a questionnaire in which they want me to evaluate the new version of *Screen Writer II*. In addition, at the conclusion of the evaluation period, they're sending me a whole new package, including all new documentation.

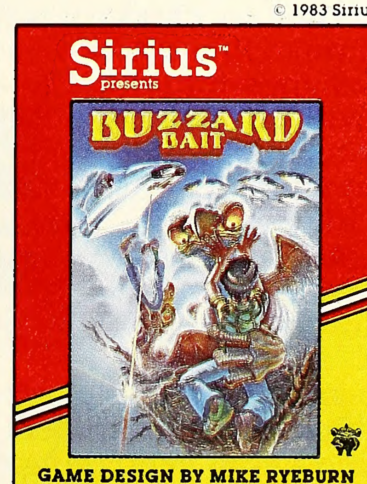
BUZZARD BAIT™



Sirius™

For more information contact your local Sirius dealer or contact Sirius directly at 10364 Rockingham Drive, Sacramento, CA 95827; (916) 366-1195.

Apple II, II+ & IIe Disk
IBM-PC Disk



Game design by Mike Ryeburn.
IBM-PC version programmed by Uriah Barnett.

HOW TO UNSC
YOUR NEST

It doesn't take a computer to tell you that money can't buy you happiness.

But at last there is a piece of personal computer software that can make you a lot happier about your money.

And you're looking at it.

Who needs it?

Dollars and Sense™ is designed for everyone who wonders where their money is going. Or why it isn't going as far as it used to. Or even as far as it's supposed to.

It's designed for people on a budget. And for people who aren't.

It's designed for people with expense accounts. And people who just want to account for their expenses.

For people who don't know a thing about computers. And people who know everything.

For people who can't balance a checkbook. And people who can do it in their sleep.

And if you've read this far, it's designed for you.

Where have all the dollars gone?

Dollars and Sense saves you money by organizing your money. By giving you the clearest picture you've ever had of your financial behavior.

You can establish budgets along any lines you like. Monthly or annually. Fixed or variable. On up to 120 accounts.

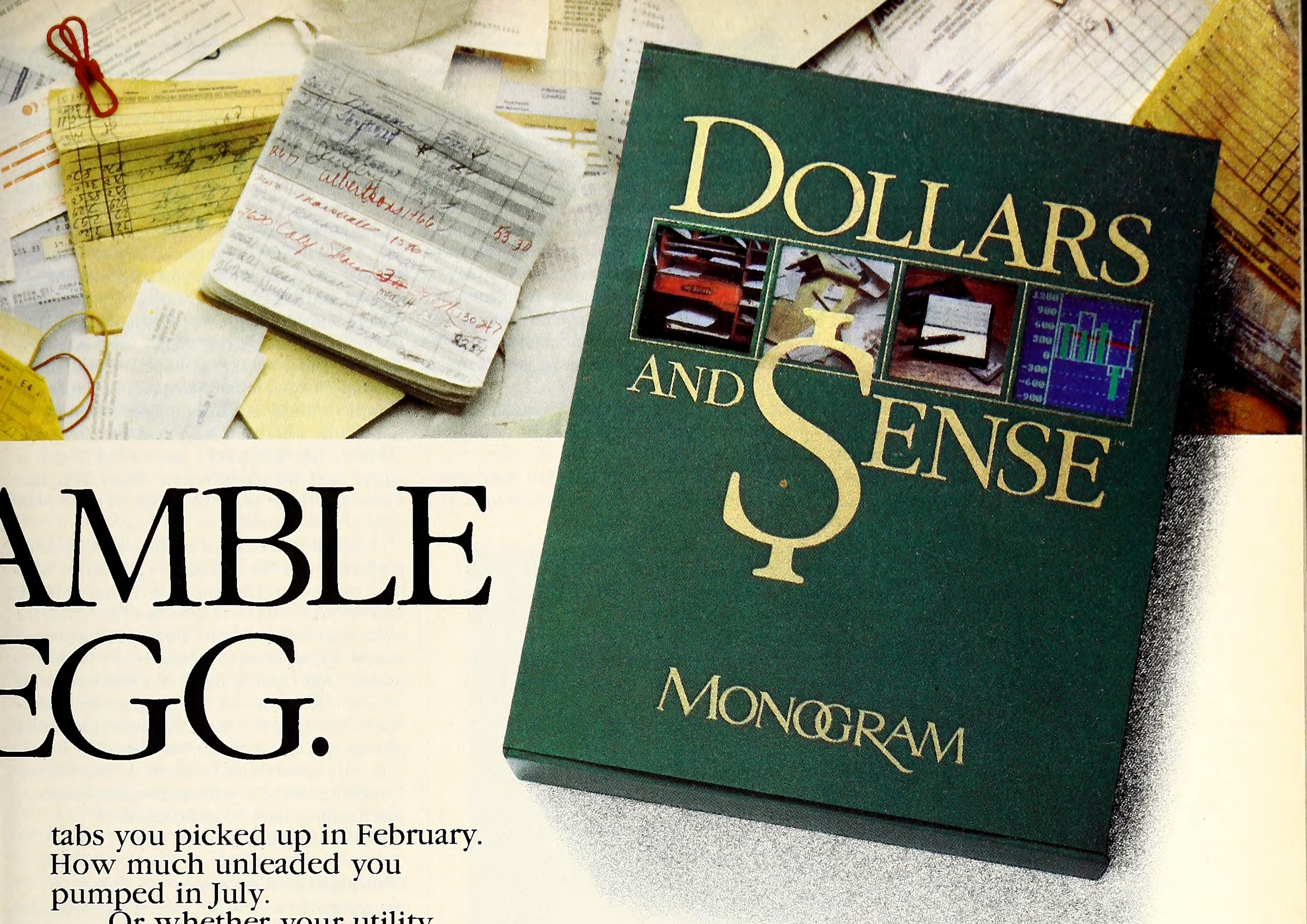
It can write checks, make transactions automatically, even remind you to pay your bills.

And as time goes by, it tells you exactly how you're doing. With a complete set of reports and full-color graphs.*

Year-to-date summaries. Income statements. Balance sheets. Cash flow analyses. Monthly and yearly comparisons of where you wanted to be vs. where you are.

You can look into the future to discover how much damage that new car, new driver, new dress or new baby will do to your budget.

Or look into the past to find out anything you like. Like how many bar



AMBLE EGG.

tabs you picked up in February. How much unleaded you pumped in July.

Or whether your utility bills have gone far enough through the ceiling to justify a new roof.

And all you have to do is spend a few minutes each week telling your IBM® PC, Apple® II or IIe what came in and what went out.

Tax break.

You can use Dollars and Sense around the house or around the office.

And around April 15, you'll be glad you did. Because a few simple keystrokes will present you with all the information you need to satisfy Uncle Sam.

If you do your own Long Forms—or your own loan applications—you'll save time. If someone else does them for you, you'll save money.

Year after year.

User friendly. Really.

Dollars and Sense also happens to be very easy to use. For everyone who uses it.

If you're a novice, at computing or accounting or both, don't worry.

The interactive demonstration disk will get you started. And the program will keep you going. With sample accounts, on-screen prompts and two different beeps.

One for typographical errors. And another for other kinds of errors.

As you get faster, so does Dollars and Sense. You can enter and edit large amounts of information, right on the screen. Move from function to function without waiting around. And get instant, up-to-date reports.

On screen. Or on paper.

And one more thing. Dollars and Sense is tax-deductible.

But only if you use it on your taxes.

MONOGRAM™

8295 South La Cienega Blvd.
Inglewood, CA 90301
213/215-0529

In my years in both the private and government sectors, I have never witnessed such product support. You should appreciate the fact that, barring the first Applesoft disks, I was never totally without a word processing capability. From the day the premier issue of *Softalk* arrived on my doorstep, I have read of "the good, the bad, and the ugly" of the computer market. Sierra On-Line is among the good. And on that you can bet "a fistful of dollars."
Walter W. Frank, New York, NY

Custom Packages
I agree with readers who feel that many off-the-shelf software packages are extremely clumsy for the first-time user. There is, however, at least one software house that offers general accounting packages with a warranty of usefulness to the customer. This company is Personal Computer Consulting and Services. The package is not distributed through major chains but is sold directly to the end user with any needed customization to tailor the package to his business. Training and after-sale support, as well as a guarantee to provide future modifications to the package as the customer's requirements change, are provided. This level of support and training costs more than the price of the typical off-the-shelf software, but I feel it is well worth the higher price.
Forbes E. McCann, Jr., Perkiomenville, PA

Really Super
Super-Text was one of the original word processing programs in the early days of Appledom. I bought my first copy three years ago and have never regretted it. The publisher has cautiously and deliberately upgraded the program over the years (twice so far), and I am not aware of any "buggy" upgrades being released prematurely. Muse Software has endeared itself to me because the company lets you keep both the old manual and the old program, which are compatible with the upgrades. Upgrades cost fifty dollars; I feel that's reasonable, all things considered. The program is compatible with most, if not all, hardware for the Apple. For instance, it works with Mountain Computer's Multifunction Card, whereas I have had to send *Word Handler* (the program I am forced to use at work) back for modification. *Super-Text* also includes printer paramèter files for use with most popular printers.

I would like to warn people about possible problems with *Word Handler*. At work I have tried to use it to keep my boss happy. I finally said the heck with it—I have had files crash for no conceivable reason. I have had my time wasted by our secretary because the manual is useless, and I had to figure out how to operate certain "features" of the program by guesswork. This program has deficiencies I wouldn't tolerate in a $50 program, let alone a $200 one! The only good thing I can say is that Silicon Valley's service is excellent—unfortunately, you too often have occasion to use it!
John W. Maynard, Boulder, CO

Offsetting the Weaknesses
Regarding the review of *OptionX* that appeared in Buttonwood Apples (May '83), Crawford Data has an update available to the original purchasers that provides for updating of volatility files with the *Dow Jones Market Analyzer*. This offsets a major weak spot mentioned in the conclusion of the review. Other improvements in the *OptionX* update include faster loading, as well as calculations of potential gains and losses based on statistical projections of possible price changes in the underwriting experience.

Another advantage of this supplier is the backup provided by the author. I have found him both helpful and cooperative in my experience with his software.
William G. Daly, Edmonton, Alberta, Canada

A Way through the Woods
As a registered professional forester, I would like to inform readers of the formation of a new nonprofit membership organization aimed at ensuring ready availability of practical forest-resource-related computer technology.

The Forest Resources System Institute (FORS) is the result of the combined efforts of consulting foresters, state and federal forestry agencies, forestry schools, natural resource associations, extension forestry services, and federal agencies. For further information, I suggest that readers contact the Forest Resources Systems Institute, Box X, Norris, TN 37828.

The software available through this institute has been designed for operation on Apple, IBM, TRS-80, and TI computers. I consider the *Woodplan* system, available through this institute, to be the most comprehensive package

available for personal computer applications in the forest products industries.
Cecil J. Saunders, Jr., Morganton, NC

Ears to You

Something potentially dangerous happened to me recently regarding microcomputers and I would like to pass a warning on. It started out quietly enough. Before I turned my car engine on, I thought I would sit and listen to the raindrops bouncing off the roof. I heard the delicate popping sounds and appreciated the input of sound into my construction of reality. There was, however, a persistent high-pitch ringing in both of my ears.

As an audiologist, I had the interest, knowledge, and access to sensitive detection equipment to investigate. What caused the ringing? Was it temporary? Was it dangerous? Where was the source? The answers were determined, and this ringing, dear *Softalk* reader, could happen to you.

I suffered from something called tinnitus. The subjective frequency I heard was a high-pitch whine I thought I had never heard before, but, upon reflection, I remembered that it sometimes occurred whenever I turned a TV on. The high pitch then apparently went away. The intensity of the subjective whine was enough, in scientific terms, to drive me bonkers.

Alas, I had just purchased my new pride and joy, a thirteen-inch color monitor. Man, this baby had everything. It had a 400-line resolution, fantastic color, adequate resolution for text, a separate RGB eight-pin input plug, separate audio amp and speaker, great external looks, *and* the price was right. It was the new Panasonic CT 1300D Data Grade color monitor.

It also uses a 15,734 Hz (cycles per second) oscillator for its horizontal-scan synchronizing signal. This pure tone was the culprit. The tone was emitted at a 58-decibel sound-pressure level when the microphone of a sound level meter was placed next to the case. The 16,000 Hz octave-band analyzer indicated that the 58 dB dropped off to 34 dB at the average position of the operator's ear. All other potential signal sources were disconnected. When the monitor went on, the needle went up and stayed there. When the monitor went off, the needle went down and stayed there. That experiment was repeated many times with consistent and repeatable results.

According to the most recent literature on the subject, 58 dB and 34 dB are not noise-hazardous and should not cause tinnitus. The federal standard for the level of hazardous steady-state noise is 90 dB for an eight-hour period. As an audiologist and someone who has a hearing loss, I wish to warn all users of monitors that the monitors are emitting a potentially tinnitus-inducing tone at approximately 16,000 Hz. Those whose hearing is normal may be unaffected and suffer no prolonged ringing or damage. However, previously damaged ears may be especially susceptible to this 15,750 Hz pure tone and may suffer further damage at emitted levels that are now thought to be non-hazardous.

My ringing continued for forty-eight hours and then subsided, but it resumed with five minutes of use of my old green screen. I now have my trusty NEC green screen in a sound-attenuating enclosure of tape and felt. According to a noise-control engineer, this will adequately absorb the tone if it is emitted from within the unit and not radiated from the metal cover. Cooling is another problem if the unit is covered. My ringing continues for a few hours at a time several times a day.

The pure tone sound level from the NEC is slightly lower at 34 dB at the operator's ear compared to the color monitor with 36 dB. I also measured a ten-inch Panasonic color monitor, the CT 160. It had the highest levels of all with 44 dB at the operator's ear. The Apple II itself was devoid of any audio tones. (Radio interference is another area.)

It may be that only previously damaged ears are susceptible to this very real, very pure tone being emitted from monitors. Here is a test to determine if the emitted tone is affecting you. Call it the "on-off" test. If you have a prolonged ringing in your ears, give them a rest over a weekend. Then turn on your monitor and listen to hear if you can detect that it suddenly came on. Then turn off the monitor after a few minutes and see if you can detect whether the tone stopped. If you heard the tone start when the monitor was turned on, and continued to hear the tone, but could not detect that the tone stopped when you turned it off, then the tone probably has triggered tinnitus. If you can detect the tone starting and stopping with your turning the monitor on and off, you can probably assume you haven't been affected by the tone.

Future research on very high frequency ef-

fects on humans may reveal that it is not the intensity of the noise that causes the damage but the pureness of the signal. A sharp knife cuts with little pressure; loud rock 'n' roll may be the butter knife and the quiet 15.75K Hz pure tone may be the razor blade. The horizontal scan synchronizing oscillator tone can be called the Japanese sword.

The brain detects the tone because of the firing of tiny hair cells in the inner ear. If the vibration causing the hair cells to move and fire is too strong, or too long, the hair cells break and, instead of firing in response to a stimulus, fire when they want to, causing the phenomenon known as ringing. My wife is very helpful to me when this happens. When I say, "My ears are ringing," she says, "Well, answer them."

Televisions emit the same tone, but TV viewers sit further away than monitor users, so the effect is decreased. I measured the sets personally, using a calibrated sound level meter in a sound-attenuated room, and I am solely responsible for the numbers and conclusions. *Softalk* is not responsible for the accuracy of the tests or conclusions but hopefully will print the information for the potential health-and-welfare benefit of its readers. Returning the monitor was a distressful event because it took so long to choose it, justify the expense, and drive down to pick it up, and I really needed the color to help me get past the nineteenth maze of *Snack Attack* after starting at entry level five. One dot from maze twenty!

J. Barry Smith, Fort Devins, MA

Holding His Nose

It is clear that Charles T. Morrow (June Open Discussion) belongs to that class of people who are finding it intolerable to live in the atmosphere of unrelieved tension that the deployment of nuclear weapons has created—and who would just as soon get it all over with and launch a war against the Soviet Union right now.

I found it curious that Mr. Morrow began his criticism (his own term, "diatribe," would be more accurate) by pointing out that Robert Marlow (April Open Discussion) is an expatriate—as if the choice by an American to live outside America were somehow treasonous. This primitive tribalist mentality is one of the root causes of the present nuclear peril. Unfortunately, not only Mr. Morrow but also those of us who do not share his warmongering views are threatened with destruction.

The American people, manipulated by the media as they are, are not yet so gullible as to accept the official government propaganda characterizing the Soviet Union as, in the classic (and recent) words of President Reagan, "the focus of evil in the modern world." Nevertheless, there is a persistent war mentality being fostered in this country, and the current crop of "war games" reinforces this mentality. If one does battle nightly with the evil Soviet tank divisions (entranced by the simulational capacities of the Apple), then one is more likely to support the real thing, which certainly promises to be much more exciting than any computer game.

Although the first use of nuclear weapons may not be the cornerstone of NATO's defense policy, their use (whether first, second, or third) certainly is. Mr. Morrow's justification for the deployment of nuclear weapons (and intention to use them "if necessary") is the "huge conventional arms superiority" supposedly possessed by the Soviets. The implication is that nuclear weapons are necessary and will be used in the event of war. Given the enormous destructive powers of the nuclear arsenals on each side and the high probability of total retaliation against whomever pushes the button first, this policy constitutes a fine plan to commit racial suicide. Better dead than red, eh, Mr. Morrow? Well, speaking both personally and on behalf of my children and their children, I say this policy stinks.

Alfred Roy, Berkeley, CA

Collision Course?

I have been a board war-gamer for about five years, with such games as *Third Reich*, *Bismarck*, and *StarFleet Battles*. The only things these games represent is an exercise in strategy and tactics in a competitive environment. When I play one of these games, I don't particularly care about the political situation underlying the conflict. Personally, I think war is a stupid idea in real life, and the world would be a hell of a lot better off if, instead of an arms race, all the top brass of the world got together and played *When Superpowers Collide*.

James Moore, San Diego, CA

Walk a Mile in My Boots

I agree with the majority that copy protection should be removed from most products. However, there should be better laws to help small companies fight large-scale pirates. A small company simply cannot afford to prosecute a pirate today. It is understandable that many companies are afraid of what will happen if they remove copy protection from their products. After all, won't they lose many sales? Maybe so, but maybe not.

I usually will not buy software that is copy-protected, simply because I like to list and modify programs. If I buy some hobby programs, what good do they do me if I can't put them on the disk I'm writing programs on? I refuse to reboot a disk every time I think of a new modification to the program I'm writing!

Another point, as Ira Strum mentioned (July Open Discussion), is that kids won't buy software if it takes them three or four months to save up for it.

Schools don't help the fight against copy protection. I admit it isn't fair to make schools with a limited budget buy one copy for each computer, but there should be limits. What if seven school districts got together and bought a $70 program. Then they could make 140 copies of it and send them out to the schools. Would that be fair to the companies and programmers?

I am thirteen years old and get $8 a month, plus what I make selling programs to a local company. One of the programs I wrote retails for $200, of which I get $140. This means that the above scenario would cause me to lose more than $10,000 of my hard-earned money! (For those who would question the "hard," I spent six months writing that program!) Pirates hurt programmers more than companies! Listen, all you pirates: Would you still copy programs if *you* wrote them for a living?

Anton Rang, New Richmond, WI

Fugitive from Goons

I enjoyed seeing your August Job Hunt contest which concerns the former occupations of prominent computerists. As a result of this contest, many people are now curious about what I, Jack Cassidy, was doing back in the mid-seventies. Well, as it happens, I was teaching creative writing in Colorado, and before that I was an obscure nuclear reactor technician in California. Then the eighties came, and *DOS Boss* made me famous.

Some people (like my family) are also curious about what I'm doing now. I'm very sorry, but that's strictly confidential under the terms of my contract. And I don't want Bert Kersey's goons coming after me.

Jack Cassidy, San Diego, CA

Voter Registration

I am looking for a routine that can be used in any program to scroll the hi-res screen up, down, left, or right. Any suggestions?

I disagree with the Open Discussion letter complaining about how nobody reads Fastalk. I do, and enjoy it very much! It keeps me informed on any programs that slip past my local computer store. (I do agree that some of those programs that are classics shouldn't be.)

For Mark Pelczarski: Penguin Software is my favorite software company (Sierra On-Line is my second favorite). Penguin has guts to try

new things like $19.95 games and unprotected graphics programs. I have the *Graphics Magician* and it is the best graphics system I have ever owned.

I think Apple should sue any imitators of its computers. When I saw the Franklin computers, I was amazed that they could make them legally. It was only a few weeks later that I learned that if I went to Japan I could buy an Apple software-compatible computer for under two hundred dollars. I believe that we Apple owners should march down to the nearest computer store that sells those computers and smash them into millions of pieces. All in favor say, "Aye." Finally—before I start my neighborhood march—I would like to give a word of advice to software publishers: You should follow Penguin Software and lower your prices. This, in turn, would reduce software piracy, which you are all so eagerly trying to stop.
Craig Weinhold, Madison, WI

Not Too Shabby

Hold on, folks! Don't we check the accuracy of the entries in Fastalk anymore? I refer to the first entry in the Communications section of the August issue, for *Apple Link*. It states, "Only modem software known that can transmit *Screen Writer* text files." Oops! This letter was written on *Screen Writer* on my Apple II Plus at home, sent via *Data Capture 4.0* to my company's big IBM, and then delivered to the IV Phase word processing machine in my office. It is printed on the letter-quality printer associated with the office word processing system. Now, that's not too shabby, is it?

I don't even know of anyone using *Apple Link*, but I do know of scores of people doing just what I did here with *Screen Writer* and several of the other good communication software packages that transmit Apple DOS text files. Knocking the competition is said to be bad advertising strategy and it sure seems like bad strategy for Fastalk, especially when the information is incorrect!
W.J. Griebstein, Cincinnati, OH

Brain Power

As a computer novice and accounting illiterate, I set out to make a home finance program my first major software purchase. I fear *Softalk*'s Fastalk column almost led me astray.

The Home Accountant is called "thorough and powerful." *The Accountant* is more expensive and gets modest descriptions like "simple-to-use" and "a sleeper." The choice should be obvious.

In fact, I believe *The Accountant* (the more expensive program) is so far superior as to justify the cost. It gives the user credit for brains but will handhold you through a remarkably effective double-entry system. That part might scare people off. In fact, it makes this program more enjoyable, as well as being educational and practical, but not more difficult. The documentation and tutorial are excellent, and Decision Support Software gives excellent user support.
Henry Tenenbaum, Washington, DC

It's a Frame-up!

I didn't know the gun was loaded. Honest, Your Honor, I wasn't even in town that day. I'm throwing myself on the mercy of the court. Let's plea-bargain. Toss out the conspiracy charge and I'll accept guilt through association, or perhaps a sin of omission.

Okay, my name was on the *Plasmania* package (exhibit A for the prosecution), and I did associate with known Sirians, but I can explain all this. About a year ago (it all seems so hazy now), I was writing games for the VCS (alias Atari 2600) and I designed one called *Fantastic Voyage*. It was a 4K game written specifically for the capabilities and limitations of the system. So far, no problem. Then, from on high, came a management decision (is there any other kind?) to translate this and other VCS games to other formats. The Atari 400 versions were passable, and some of the VIC-20 conversions, programmed by the highly talented Leonard Bertoni of Pittsburgh, were quite good. Still no problem. Then the first 48K Apple conversion appeared, the results of which were covered in *Softalk*'s Marketalk Reviews. I have no argument with the review. Indeed, I applaud honest criticism, having taken some flak myself back in the days when I was writing reviews. But I didn't ask for my name to be emblazoned on the front of the package! That, Your Honor, was a frame-up.

I feel good about the VCS games I wrote. Some were praised, some got mixed reviews, and one or two vanished without a trace. But I can accept no praise, nor share any blame, for anything they spawned in the way of conversion—with one exception. I did convert and upgrade *Nexar* for the Atari 400. However, for reasons too complicated to go into here, someone else also wrote a conversion. I don't know which version, if any, will be released. Caveat emptor.

So that's my story, Your Honor. I've gone straight. I, along with my unindicted co-conspirators, Mark Turmell and Dan Thompson, have joined Activision. The defense rests.
David Lubar, Sacramento, CA

Lobbying for Kids

I am thirteen years old. I've had my Apple II Plus for about two years now, and in school there are Apple classes for students in the fifth through the eighth grades. I've been taking the class for two years. I am in the eighth grade. Our school has six computers and hopes to get maybe ten more next year.

I know that a lot of adults read *Softalk* but so do many kids! This is why I'd like to see more columns and contests especially for kids ten through sixteen years of age. Many friends of mine feel the same way.
Darin Sender, Oak Forest, IL

I would like to congratulate you people on stumping almost all the readers of *Softalk* each month with your strange assortment of contests. You have consistently produced contests that have left me in their dust, mind-boggled.

As a fourteen-year-old, I feel that most of your contests have been geared toward adults, not children. I think you should have a contest every once in a while that is geared toward young readers—or maybe even have a separate

contest each month for those of us who are under the age of sixteen.
Chris Pescosolido, Lindsay, CA

Pie in Our Face
Thank you for running the announcement of Apple PIE Writers in the August Open Discussion. However, I wish to point out that our mailing address as published was incorrect. The correct mailing address is Apple PIE Writers, 12841 Hawthorne Boulevard, Box 589, Hawthorne, CA 90250.

We wish to extend our sincere apologies to those who attempted to join but had their mail returned and were inconvenienced.
Mike Weasner, Hawthorne, CA

The Real and the Imaginary
I was very surprised to read the following statement by Tom Weishaar in the August DOStalk: "The Integer file Applesoft is supposed to contain cassette (or disk) Applesoft, but it never does. In fact, there seems to be no evidence that Apple ever actually released a version of cassette Applesoft on disk. If any of you know differently, let us know."

Tom, how much evidence do you need? You will find this forty-three-sector file on the Apple System Master disk for DOS 3.1, 3.2, and 3.2.1. It simply has not been that long since that practice ended. The first time it didn't appear was on the DOS 3.3 System Master!

All of the comments made by Weishaar on the much earlier Applesoft on cassette tape seemed accurate. The only point left out was that Applesoft on tape was usually called Applesoft II, to distinguish it from the earlier Applesoft I. I'm glad that Tom disagreed with some people who claimed that Applesoft on tape was imaginary. The Applesoft II cassette in my closet feels rather solid for something that doesn't exist!
Jim Nichol, Cincinnati, OH

Spec Changes
Regarding the article about the computer desk by Robert Stang (April '83): I'd like to suggest a few changes in the specifications.

Piece number nine should be 17¼ by 9¼. I also suggest that piece number one be 18 by 48 and piece number two be 18 by 23¾ rabbet. On special cuts piece number two, how about only one ½ by ¾ rabbet, and on piece number one rabbet, how about only one end ½ by ¾. This allows a smooth surface over the entire top. You could also rabbet piece number nine into piece number six midway, as you choose.
Dale Tyler, Belton, TX

High on Apples
Howdy! I'm serving time in prison up here in the frozen north, Alaska, and during my stay here I discovered computers. Since resources here are severely limited, your magazine has been an invaluable aid to me while I've learned. I'm pretty spoiled here now. The administration has provided me with my own room, an Apple II Plus, two floppy drives, ten megabytes of Corvus storage, a Microline printer, and various add-ons and peripherals. I make three dollars a day writing database software for them. Needless to say, my Apple has replaced cocaine as my favorite mind-altering substance!
David Moss, Juneau, AK

A DRUG for You
As a result of the letter in the August Open Discussion, I have just written to the Apple PIE Writers to join that user group. Without realizing it, I must have been waiting for the announcement of that group to spur me into action of my own. The two programs I use the most are *PIE Writer* and *Data Reporter* by Synergistic Software. I believe these are, without question, the best word processor and database management programs available for the Apple.

I am writing to ask if there is a *Data Reporter* user group (DRUG) that anyone is aware of, and, if not, are there any *DR* users who would like to try to start one? I would be willing to act as a clearing-house to get the ball rolling. Anyone interested?
Thomas Militello, Rancho Palos Verdes, CA

Still Poking Around
Hello, remember me? I'm Matt Offenbacher and I wrote to Open Discussion a few months ago. I was the one who had some interesting pokes and peeks. Well, I'm back and here's another list!

Remember the poke 50 (1-255) that scrambled the text output? If you poke 50,128 it will make any output invisible. Even your listing!

If you have this poke at the beginning of your program and at any point have an end statement, or if you break out of the program, when you type anything it reruns the program. This poke is handy: poke 214,255.

If you want to protect your programs, use this. When this poke is used it makes the first line of the program list over and over. Try the sample program that follows:

```
5  REM REMARKABLE PROGRAM!
10 POKE 2049,0 (this is the poke)
20 ?"THIS PROGRAM WILL ONLY LIST
   THE FIRST LINE OF THE PROGRAM,
   OVER AND OVER!"
30 END
```

How about this poke. It will spin your disk drive without reading or writing anything. You can even take your disk out and it will still spin without an error. Use poke 49385,0. To stop the drive after this, type poke 49384,0. Pretty neat, huh? Well now, check out this call. Be very careful using it. It locks up your whole disk and you can't write anything on it. Before using this, back up the disk you're using. I don't want to be sued!

```
CALL 42340
```

Until recently I didn't know that there was a Basic command called *wait*. This command works kinda like a peek when used with the right number. Anyway, use this to have the computer wait for you to hit a key: wait-16384,128.
Matt Offenbacher, Lake Oswego, OR

A Shortened Version
In the April Open Discussion, Raymond E. Green, president of Technocom, wrote in with a solution to a previous letter titled "No Small Change." The solution was that of putting numbers into two decimal notation. I have a subroutine that I use extensively in all my programs for that same application. The one big difference between Green's solution and mine is that mine is a lot shorter. The program follows:

```
10 REM 2 decimal notation
20 L$="":U=1
30 IF A<0 THEN L$="-":U=-1
40 A$=STR(INT((A+U)*100+.500001)):
50 A$=L$+STR$(INT(ABS(A)))+"."
   +RIGHT$(A$,2)
60 RETURN
```

All a person has to do before entering the subroutine is convert the variable in use to "A." After returning from the subroutine, convert A$ back to a usable variable in the program.
John Byers, Hibbing, MN

To Fellow Readers and Readable
I am the proud owner of an Apple IIe and wish to make a few comments about it. First of all, the Mini-Assembler is back on the IIe. Just boot Integer Basic from the DOS System Master, type int, then call -2458. You then get the "!" prompt and you are ready for assembly language programming.

I enjoyed Don Worth's article (July '83) on the 560-by-192 graphics. It's even visible on an Amdek Color-I monitor. I noted a bug in the listing 2 program on page 126. Add this line:

```
135 HCOLOR=7
```

WHATSA DILLY?

he DILLIES have landed—eighteen pairs in l—and have taken over the PICK-A-ILLY HOTEL. There's one in each of the 5 rooms. The only problem is they failed register. You're the room clerk and your b is to locate the matching pairs.

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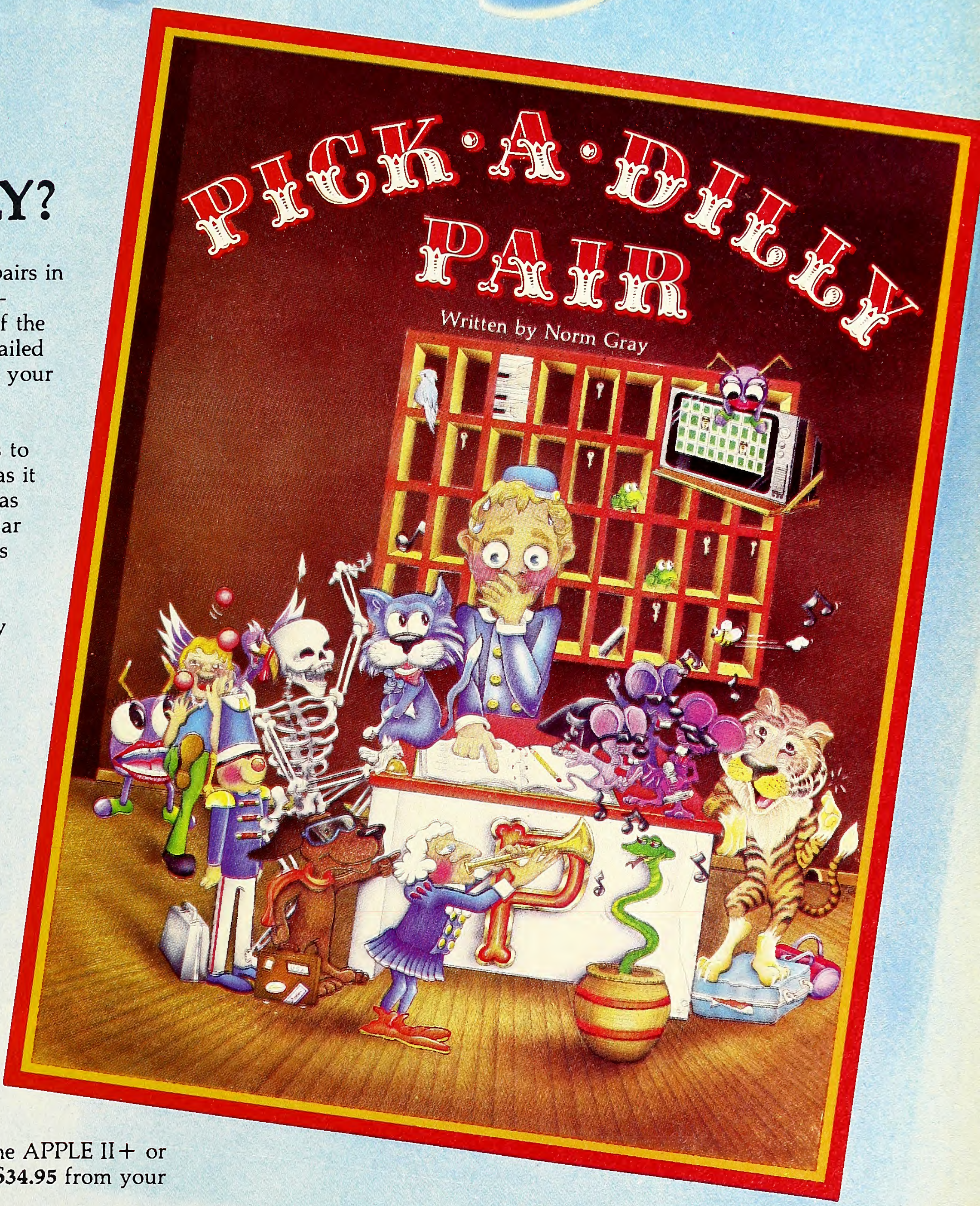

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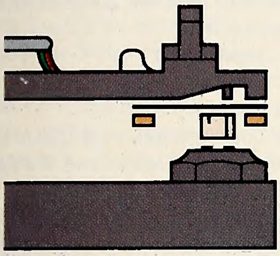

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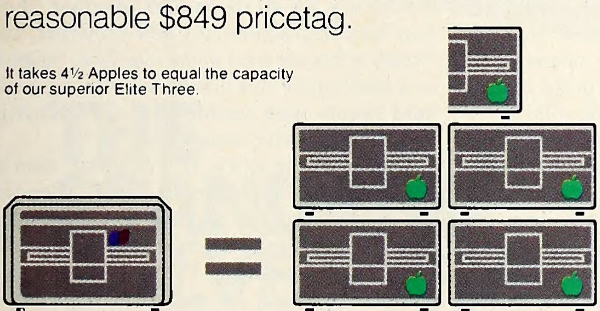

The Elite Two offers an impressive 326K bytes and 40 tracks on each side. This drive is making a real hit with users who need extra storage, but don't require top-of-the-line capacity. Costwise, it takes 2½ Apple drives to equal the performance of our Elite Two. And twice as many diskettes. Leave it to Rana to produce the most cost efficient disk drive in the world.

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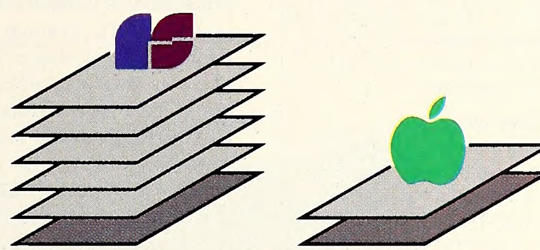

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Also, I got confused on page 124 where it says that poke 49246,0 turns AN3 on. Actually, that poke turns it off. Apparently a change of state turns on the double-hi-res graphics. Sort of like negative logic. Am I right? Anyway, that poke is correct in the programs.

Does anyone out there have the following combination—Apple IIe with an eighty-column card and an Amdek Color-I monitor? If so, you probably already noticed that you can't decipher eighty-column text on that monitor. The following will make it more readable:

```
10 PR#3:REM TURN ON 80-COLUMN CARD
20 PRINT CHR$(15);:REM TURN ON
   INVERSE
30 PRINT CHR$(12);:REM CLEAR SCREEN
   TO WHITE
40 REM REST OF PROGRAM. . . .
```

With black on white it's still not very good, but at least it's legible.

Now for some rebuttal on comments made in past Open Discussions. To Alan R. Fischer: What are you going to do to the guy who burned your disk? To Norman Jonston and Ira Strum: Right on! To George VanWagner, Gary McPherson Mugford, and Robert Marlowe: Three boos! To Poppi Kosak: Are you reading the right magazine? To Richard Steck: That's an unnecessary warning.

To whom it may concern (who owns an Apple IIe): What is the name for the following ASCII characters: \(96), ¦ (123), ~(126)?

Jerry Van Cleeff, Montgomery, AL

Strange Behavior

Before you finish thinking about trading up to a IIe, let me tell you that it would probably cost more to sell or trade your II and buy the IIe than it would to buy a keyboard enhancer and a memory expansion card. The IIe also has some firmware problems that you might be unaware of—nothing that really affects the operation of the machine, just some items that make it seem a little like Jell-O inside. (Not quite solid.)

Take a IIe that has a disk controller in slot 6 and the eighty-column card in the auxiliary slot. Type *PR#4* or *PR#5*. Sometimes it will go out to lunch as expected; other times it will boot the disk in slot 6. Try typing *PR#2* and sometimes it will turn on the eighty-column card and jump into the Monitor. It's strange! Turn on the eighty-column card with *PR#3* and type about sixty to seventy characters. Now go back to forty columns by typing *escape 4*. The cursor ends up somewhere in the middle of the screen. Typing something at this point will put a character there, and then the cursor will return to where it should be. Turn off the eighty-column card from a program using the method described in the manual—it disconnects DOS!

Well, nothing is perfect the first time—but don't let anyone fool you into thinking the IIe is an incredible new machine. (Everyone was similarly fooled by the IBM pc, which is quite ordinary.) The most important part of its name is the II. It uses the same Basic and the same DOS (but they screwed it up a little trying to fix append). It's so much the same that Basic still doesn't understand lower case. Now here are some suggestions for a couple of readers whose questions appeared in the June Open Discussion column.

To T.J. Venable: You might check with the Aircraft Owner's and Pilot's Association. They have a flight-planning program similar to what you have described. It is available to nonmembers at a slightly higher price.

To Judith Juskowich: Contact local user groups for help with your ideas; they can be a valuable aid. But why limit the computer's use to those considered gifted?

Michael Gibbs, Denver, CO

Ham Sandwich

To continue the house ground wire discussion of Paul B. Brumbaugh (June) and Edward Parker (August): My grounding education began with a radio ham's complaint that my Apple IIe was blasting him off the air. He had followed his handheld receiver's signal to my front door; and there was no doubt that I was radiating, probably illegally. My letter to the FCC asking for assistance in measuring radiation levels to determine conformance to FCC Rules Part 15(J) produced only a pamphlet telling me what to do if a ham was interfering with my TV reception. Go buy a filter, it said. (Evidently the FCC is unaccustomed to dealing with the general public's interference with licensed ham operation; it usually works the other way.)

The problem was a faulty electrical connection to the breaker panel in my house. The ground wires from multiple circuits had been braided together by the installing electrician for common clamping to the system ground, but the ground wire of one circuit (guess which one) was an inch short and was not included in the actual clamp connection. I rerouted the wire, included it in the ground connection, and the radiation problem vanished.

It resurfaced, however, soon after I installed a Microtek RV-611C parallel interface (thirty-four-wire flat cable) to my new Prowriter. Only twenty wires are used in the interface, however, so I could solve this one by substituting a standard twenty-wire shielded flat cable normally used for disk drive connection.

Moral of the story: If a neighbor ham appears on your front doorstep instead of on your TV set, you (not he) probably have a problem, and a little time and ingenuity can fix it.

Dick Smith, Pensacola, FL

Touchdown Time

In response to Philip Arnold's inquiry (June Open Discussion), Touchdown Systems's *Game Plan* program enables even computer novices to make sophisticated database inquiries about their opponents' play-calling frequencies and patterns. Any interested readers can obtain a brochure by writing to Touchdown Systems, 18 Stanford Avenue, Colonia, NJ 07067.

Richard Kaye, Colonia, NJ

Plugging the Loop Hole

For Mark Yannone (June Open Discussion), the problem with the Osborne/McGraw-Hill Transportation Algorithm is in line 830 I=0, which resets a loop counter to 0 on every pass through a loop and consequently never exists. Initialize I outside the loop by deleting line 830 and inserting 785 I=0.

I have written a transportation program incorporating Vogal's Approximation Method, among other goodies. If anyone is interested, write me in care of Open Discussion.
Theodore Lesher, Atwater, CA

Upper Escape Case
This is a reply to Charles Patalive's letter (August Open Discussion) in which he stated he was unable to insert printer escape commands using the Videx eighty-column preboot with his *Apple Writer II.* His difficulties may simply be that he is not entering upper-case letters when entering the escape printer codes.
Francis E. Flavin, Jr., Hatfield, MA

Getting Decoded
I have an answer to a question by Pete Higgins (August Open Discussion). Have you tried the instructions in Appendix B? They didn't work for me (I have a NEC Spinwriter 7720 and an Apple III). Look in your printer manual for any sort of "codes." If there are some, try control-V and type that code. For example, mine (for subscripts) is control-V, then escape colon, then the letter or number I want, and escape semicolon. Try it.

I congratulate you on your August issue for having only a small amount of advertisements for things like strip poker, Garden of Eden computers, and such. Also, I noticed lots more advertisements pertaining to the Apple III. Thank you.
Frank Hammers, Saint Martinville, LA

Wrong Computer
I need some printer help. I have a NEC printer hooked up to my Apple II Plus. The printer works fine, but the manual that comes with it shows many different fonts that can be done. The problem is, it's all written for the NEC.

Can the Apple do all of these different fonts on this printer? If so, what are the commands? If the Apple cannot do all of these fonts, then would an EPROM IC work (I have a Grappler interface, the original type, not the Grappler +)? Can the Apple do graphics on the NEC printer without having to use a utility program that loads a "B" program and dumps it? Isn't there a command to dump an Applesoft Basic graphics program to the printer?

As you can tell, I'm actually using only half of my printer. I'd appreciate any response to this problem.
John Flikeid, Annandale, VA

How Do You Dump?
I'm hoping that someone knows how to help me print graphics from a program I'm writing. I have a NEC PC-8023-AC printer with an Epson APL Board in slot 1. I need some sort of screen dump for this program. I can't use *Zoom Grafix* on this. Any help I could get would be appreciated.
Paul Cullen, Kansas City, KS

No Taste for Hash
Screen Writer II users to the rescue, please! My files are being hashed—that is, parts of files are appearing in other files. For example, if one file has words starting with the letter A only, and another has words starting with the letter B

only, I'll call up file A and find it mixed with Bs. I'm using an Apple II Plus with 64K and one disk drive.

Following Sierra On-Line's suggestions, I have tried *S (file name)* to save, saved to a different output file name each time I work, and limited the number of files per disk to no more than ten pages total. The company has replaced my *Screen Writer II* disks, but even with the new ones the problem persists. Other programs, such as *VisiCalc* and *Magic Window*, work perfectly on my equipment.

Has anyone out there had the same problem and solved it? I'd appreciate knowing about it before giving up on the program, which I love.
Roy C. Bennett, Flushing, NY

Banking on It
I would like to know if anyone can give me directions for utilizing printer commands for an Epson MX-80 F/T with *Bank Street Writer* on an Apple IIe. I know that they cannot be embedded in the word processing itself.
Jay Cooper, Kansas City, MO

Overlap Delay
I use a filing program called *PFS:File* quite often in my job. When I enter the print function of the program, I tell it to print something and then go to the next line. The command I am using is the proper one, but when printing time comes, all of the words and information overlap each other. It seems that the advance to the next line does not work in my *PFS:File* program. Can anyone help me? This problem is causing delays in my work.
Sean Roberts, New Orleans, LA

File Help
Perhaps *Softalk* readers can offer me some assistance. I have an Apple IIe without the eighty-column board and an Epson MX-80 with Graftrax Plus. When using *PFS:File* I would like to be able to set the right and left margins and page lengths to skip the perforations. Also, the *PFS* manual suggests the control-O command to get a 132-column printout. When I use it, I get a compressed code with an eighty-column print line length, not 132. Any suggestions?
Alan Smolen, Palm Coast, FL

The President's New Carpet
My name is Norm Karns and I am the president of a new software company called Newport Software. I am sixteen years old and would like to make a few comments.

I would like to give my thanks to Bert Kersey of Beagle Bros. I have learned a lot from the disks I have bought from this company and also from the excellent documentation that comes with the company's disks. I have called Bert with problems or questions and have always been treated like a friend. He was very helpful in all cases. If you're out there, Bert, thanks a million!

Another company that's been one of my favorites is Penguin Software. They have the greatest utilities I have ever used. What's more, like Beagle Bros, they're listable, "learn-fromable," and usable in my own programs. Thanks for the help!

One problem has been weighing me down. When I first got my computer, new carpet was being installed, and in the process of moving the computer into the garage, my Epson MX-100 manual got lost in the hustle and bustle. I have written to one of the company's distributors and have gotten no reply. I would very much appreciate another copy of the manual or information about where I can send for it.

Newport Software is much obliged to you all. I have learned much from *Softalk* and plan on subscribing for the rest of my life!
Norm Karns, Newport Beach, CA

Borderline Case
I've got an Epson MX-80 that I've added some graphics chips to. I've also got version 2.0 of *Apple PIE*, a much beloved word processor. How can I suppress carriage returns from within *PIE*, thus overprinting on one line? Control-K, when input through the control-shift-M mode, doesn't do the job. Does anybody put out an Epson fact sheet for *PIE*?

Would somebody please show me how to use MicroLisp! I even bought a Lisp book and typed in a program. The only thing blanker than the screen was the look on the local salesman's face when I asked about Lisp.

I'd like to add communication capability to my Apple but I don't want to pay an arm and a leg. I've got the chance to pick up a PDA serial card and a minimodem. How limited will my options be with this combination, and what can I expect to pay for just the basic software? Further, if I hook up to the Source, or the like, and tap into a database, I'd like to copy the information to text files (to be used by *PIE*) and read them later at my leisure. That will decrease my on-line time. Would I have to pay for the whole hour or do I just pay for the portion of the hour that I was on-line?
Gary MacPherson Mugford, Brampton, Ontario, Canada

Uncode Him and Modem
Recently, I was looking in my Applesoft manual, and I saw, on page 138, the ASCII character codes. As I was looking through it, I noticed that the characters are all in abbreviations. Could anyone please tell me what they stand for? Also, I was thinking about getting a modem. Can any readers suggest a good one to consider?
David V. Luzi, Lapeer, MI

Number, Please
We want to use a modem and an Apple II Plus to divert incoming calls from an office to our home telephone during off-hours. There will be two lines in the office, one for incoming calls and one to call home (lines 1 and 2). The modem will be under control of a driver program that I will write in Basic or 6502 code. I wish to use certain functions of the modem under control of this driver program.

The modem will have to recognize when a phone is ringing on line 1 and turn control over to the driver program without answering the call. This program would then switch the modem to line 2 and dial our home phone number. After this the modem would return control to the driver program to connect together lines 1 and 2, so the caller could talk to us at home. My

own hardware and program would do the switching between lines 1 and 2. It must be possible for the system to recognize when either or both parties have hung up. This could be done by recognition of the dial tone when it returns after the conversation has ended. The system should then again be ready to accept other incoming calls in the same fashion, and the whole operation must be able to occur without any human help.

I would like to know if anyone has done this and how?
Louis S. Leclerc, Jr., Webster, NY

Beginner's Intrigue
I was first introduced to the Apple last summer when I visited a friend in New York. Ever since then I've been intrigued, trying to learn as much as I can about Apples. *Softalk* really helps—all the articles are informative and useful. May I suggest that you include an article on ways to copy-protect disks that's simple and can be understood by us beginners. Also, an article on RAM cards and how to use them in programs would be nice. I recently bought a RAM card so I can use Pascal and Logo, but I have no idea how to access it through any of my programs.
Chuck Lawson, Soquel, CA

Hi and Dry
I have been reading *Softalk* for almost a year and find it offers lots of information on all sorts of neat stuff. After looking at all the software ads and reviews, I still haven't found any software for a Hipad. Hipad? What's a Hipad? Well, a Hipad is a Houston Instrument (HI) digitizer (pad). I think it is the best digitizer on the market. The only problem is that all of the good graphics software seems to be made for the Apple Graphics Tablet. I am looking for something similar to *Special Effects* and *The Complete Graphics System II* from Penguin Software.

If the Apple Graphics Tablet were a better product I would have bought it. The fact is, Hipad is the best. How do you go about telling a software house that there is more than one digitizer on the market? Is it possible, or am I wishing for too much? Aloha niu loa (thank you very much).
David L. Moore, Honolulu, HI

Let It Mock
Not able to pass up a solicitation from *Call —A.P.P.L.E.* to obtain the opportunity to add sound effects and voice capabilities to my Apple II Plus, I recently purchased the Sound/Speech I Mockingboard, Penguin's *Thunderbombs*, and Synergistic Software's *Microbe*. The Mockingboard worked superbly with both products. It also worked in a superior fashion with the demo disks that Sweet Micro Systems, the manufacturer, provided.

Programming the Mockingboard to add voice and sound to my Applesoft Basic programs has been an exercise in frustration for me, however. Either the instruction manual was written solely for people with a background in assembly language, or I've flat missed a key paragraph or two in the manual. My programming skills are limited to Applesoft Basic. I would greatly appreciate any assistance *Softalk* readers could provide that would explain exactly how I can use Basic to get my Mockingboard to speak. Also, how do I add some of the demo disk sounds to my Basic programs?
Steve L. Richter, Fort Worth, TX

Housing Problems
Have any readers out there in Appleland removed their Disk II drives from the original housings? If so, maybe they can help with my dilemma. I have a couple of construction projects that need a housing and it sure would be nice to have them match my disk drives, since they will sit next to them. The problem is that I've been unable to locate a source for the things. I want the entire cream-colored part of the box, and there must be no added holes or damaged paint. If you have one, or know where I can get one, write to Open Discussion.
Steve Schaeffer, Dublin, CA

Shields Up
When I purchased my Apple II Plus it was just prior to the shielding of such units. At that time it presented no problem. My Apple, however, is currently located in such an area that it disrupts television viewing throughout the entire household.

After I wrote to the Apple organization several times without a satisfactory response, the people there finally instructed me to visit my nearest Apple dealer and inquire into a modification kit. That closest dealer quoted me a price twice the price Apple suggested. I then

wrote to three other Apple dealers located nearby. Two did not respond at all and the third called almost immediately to say that they could handle the matter at the price Apple quoted, but that they could not guarantee the results.

I'd like to know if any readers have solved a similar problem.
Robert E. Daily, Alma, MI

Info on Infax
I would like to hear from anyone who has used the Infax 101A disk cartridge subsystem from Vufax with the Apple II. I am very interested in adding a high-speed mass-storage device to my system and am particularly interested in the Infax 101A. Anyone who has had the opportunity to use one of these, please respond through Open Discussion. I am more interested in hearing what you don't like about the subsystem, but I'd welcome positive comments as well.
Timothy M. Corson, Colorado Springs, CO

Just Checking
I have the current *Super-Text 40/56/70* and would like to be able to use the *Goodspell* spelling checker with it. Does anyone know if this can be done? I would also like to be able to use my Royal Alpha 2001 as a letter quality printer and would like to know if anyone knows of the hardware that would enable me to do that.
Lee G. Raudenbush, Hinesville, GA

How Do You Spell Release?
In the May Mind Your Business there was a letter from Harding Rees on how to keep Epson tractor teeth from tearing up the paper. While he may be right about the paper guide pressure, a far more common cause of this problem is the friction feed mechanism. If the release lever is not in the release position, after a few sheets the paper will wander, causing the tractor teeth to jump out of the holes and chew up the paper. Better original alignment of the paper will allow more sheets to be printed before this happens but can never completely overcome it. The only solution for continuous-feed forms is to release the release lever.
Walt Hamilton, Central City, NE

Stress Watch
Can anyone recommend any sources of information on the use of computers to monitor and evaluate stress tests, such as the electrocardiogram, treadmill, or ergometer? I currently own an Apple II and CompuPro 280 system.
Walter F. George, M.D., San Leandro, CA

Can't Get off the Ground
I have been creating a roster for my U.S. Air Force Pilot Training Class and our association for the past ten years. I have been doing this manually with my electric typewriter and hours and hours of typing and updating.

I recently purchased an Apple IIe with an eighty-column card, two disk drives, and an Epson MX-100 III printer. I would like to purchase a software program that would allow me to duplicate the roster, along with its affiliated mailing labels, formatted with four names listed across alphabetically. Four across simplifies the cutting and pasting of the final print copy for reproduction, which is, typically, 500 copies. This will also allow me to utilize four-across mailing labels to send the finished product.

I'd appreciate suggestions from readers about software programs that would help me with this roster.
David L. Roberts, Roswell, GA

Scribblin' and Nibblin'
I am currently doing research on the computer as a teaching aide in the development of writing skills. The purpose of this research is to determine the effectiveness of computer-assisted instruction as opposed to traditional methods of teaching writing skills.

Some questions I am seeking answers to are: Is it cost effective? How extensive will teacher training have to be? Is there any information available that supports the use of computers in the teaching of writing skills? What are some possible sources of funding for research in this area?

Any leads or references from fellow readers of *Softalk* would be appreciated.
Ross E. Bartlett, El Cajon, CA

Boo and Boo Again
I have a Videx Enhancer II installed and I guess I must have done a boo-boo with a chip when putting it in. I figure the problem must lie in the IC's B-3 (555), B-7 (74LS257), F-14 (9334), or socket A-7 (keyboard). If anyone can suggest where the problem chip related to the display of the flashing character set may be located or suggest a way to hardwire the flashing characters into inverse characters instead, I would be grateful. I need help fast!
Richard W. Opus, Alameda, CA

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IF I wrote an Applesoft program that does direct access reads to disk using PRINT CHR$(13)+CHR$(4)+"READ FILE.NAME, R";X where *x* is the record number, followed by an input statement. After each read, I usually print a report line on my printer (a Microline 83A behind a serial 1200 baud C.C.S. 7710A interface card). All of this seems to be working fine until I put in program logic to exclude from printing some of the disk records—at which time I get a blank line printed for each disk record read, examined, and skipped. It sure makes a funny-looking report.

I have tried several things to eliminate this "feature." I took out the CHR$(13) but DOS began to act strange. I tried a PR#0 before the disk read and a PR#1 after. I played around with semicolons at the end of each print statement. Any constructive suggestions would be appreciated. *Michael R. Bishop, Shreveport, LA*

THEN Your taking out the CHR$(13) was a step in the right direction. To make DOS stop acting strange, try a print statement after any get statements or print statements that end with a semicolon. DOS doesn't need the print CHR$(13) immediately before its commands. It just needs a line feed to have been printed after all previous statements. This can be acccomplished by ending print statements with a semicolon and using input instead of get. Reading and printing at the same time can be tricky—you might try to separate the two functions. *David Durkee*

IF If there is any way to call the Monitor move routine from Basic, I'd sure like to know what it is. *Bruce Hahne, Iowa City, IA*

THEN Yes, it is possible to use the Monitor move routine from Basic with a routine invented by S. H. Lam a number of years ago. It requires that you poke the Monitor command into the input buffer and then call the Monitor input routine. A typical memory move might look like this:

```
10 C$ = " 401<400.7FEM N D823G":
   FOR I = 1 TO LEN (C$): POKE 511
   + I, ASC ( MID$ (C$,I,1)) + 128:
   NEXT : POKE 72,0: CALL - 144
```

Try it, you'll like it! Another solution to this problem appears in the IInd Grade Chats articles in this issue and last month's. *Doug Carlston*

IF If I plot a two-dimensional figure, such as a square, is it possible to have the Apple fill it in with a simple command? *Stuart Duncan, Hershey, PA*

THEN There is no fill routine built into the Apple. To have your program automatically fill an area, you'll have to either write your own fill routine or use one of several available from published software packages. (The February 1983 issue of *Softalk* had an assembly language fill routine listed in Graphically Speaking that might be helpful.) *Mark Pelczarski*

IF I typed in the Font Editor that appeared in a previous issue of *Softalk* (The Third Basic, February '83) and I have a problem. If I save a font to disk, the type comes up UNKNWN instead of FONT. The size is 1,024 characters. What's the solution? *Julian LeRoi Altenhaus, Maplewood, NJ*

THEN Your disk file is undoubtedly a FONT file; it just isn't called that. The file type is determined by the value of a single byte in the file's directory listing. Business Basic, unfortunately, has no way of assigning the proper FONT file code number or of changing the file type designation once it has been made. On the other hand, if you have Pascal you can change the file type designation easily with the Pascal Filer's Alter command. The file type can also be reassigned from assembly language by issuing a SET-FILE-INFO SOS call. *John Jeppson*

IF When I use the expression X = fre (0) in a program, the execution gets delayed for several seconds or more when I'm loading a text file. There can be a huge program in memory with lots of data, but only if the data is being read from a text file does this cause a delay. Why is this? Can it be avoided? *A. Ioannides, Ossining, NY*

THEN This will get a little technical, so hold on to your hat. First of all, the X = fre (0) command in Applesoft does two things. It tells you how much free memory there is in the computer, and it does something called garbage collecting, which is Applesoft's way of making sure that all the possible available memory is counted. All this relates to the way variables are stored in memory. Numeric variables are very orderly; they pretty much stay in one place. Because integer and floating point variables always use seven bytes each, this works out all right. When the value of the variable changes, the new value can go into the same place as the old value.

A string, however, can be any length from 0 to 255 characters, plus seven bytes for the pointer. If we used the same system for string variables as for numeric ones, the system would break down quickly. Whenever a five-byte string was replaced with a ten-byte string, the next string would be overwritten. For this

reason, only the string pointers are stored along with the other variables. The strings are stored immediately beneath the location pointed to by himem. Each time a string changes, the new string is placed in memory immediately below the last one stored. The old one isn't erased, but the pointer for that variable now points at the new string.

If you have a program in which strings are constantly changing in value, a lot of memory is used up fast, mostly with old strings. The process we call garbage collection looks through all the strings and decides which ones are currently being used and which can be deleted. Fre (0) forces this activity, so if there is a lot of garbage in memory when the command is executed, it can naturally take some time to sort through it all.

Back to the question at hand. There are a couple of ways to read strings from a text file. If the file contains just a list of words, the input statement works fine. If, for instance, you're reading text that was created on a word processor, you'll discover that the presence of commas and returns in the text confuses the input command. Consequently, a lot of people use the get statement to read the file, one character at a time, and put the characters into strings according to the special needs of their particular programs. This sounds like what's happening in your program. This type of input creates a lot of garbage strings. Just reading the word "Apple" in this way creates the strings A, p, Ap, p, App, l, Appl, e, and Apple. Reading data statements wouldn't do the same thing because the string is read all at once instead of one character at a time.

Although there may be a solution, it probably isn't an easy one. If you are willing to dive into DOS, you could write a routine to load a text file directly into memory as if it were a binary file. If you want to deal with the data from Applesoft, however, you still need some way to put it into string form. An easier way would be to write the input routine that reads the text file one character at a time in machine language instead of Applesoft. In that way, you get around saving all the preliminary forms of the final string. To do this, you will need to study how strings are stored in memory. Start with Appendix I in the Applesoft reference manual. *David Durkee*

IF I have been trying to learn more about the assembly and use of shape tables. I understand the use of such things as the draw, xdraw, and rot statements, and I am beginning to understand how to unwrap vectors and encode them. My problem is I am having trouble assembling the shape table directory. Also, if someone could help me figure out how to poke a table in from Applesoft I'd really be grateful. *Andy Ihnatko, Westwood, MA*

THEN If you've got the actual shape definitions down, you've managed the difficult part. The shape directory at the beginning of the shape table is relatively easy. Each value stored takes two bytes, although in reverse order. For example, suppose you have three shapes in your table. The first two bytes tell the number of shapes. They are stored as 03 00, which really means 0003. The next three pairs of bytes give the offset, from the beginning of the table, of each of the three shapes. If the pair 03 00 is called bytes 0 and 1 of the table, bytes 2 and 3 hold the offset to the first shape, bytes 4 and 5 hold the offset to the second shape, and bytes 6 and 7 hold the offset to the third shape. This means that you can start the actual shape definition of shape 1 at byte number 8. Its offset would then be 0008 and stored as 08 00. So now the first four bytes of the shape directory are 03 00 08 00. Each of the next two pairs of offsets depends on the length of the shapes in between. If shape 1 takes twenty-one bytes, then the offset to shape 2 would be 0008 + 0021, or 0029. Stored in reverse order, they'd be 29 00. Now, to throw you off slightly and remind you that this is hexadecimal, if shape 2 is 1D3 bytes long, the offset to shape 3 is 0029 + 01D3, or 01FC, stored as FC 01. So in this fictitious example, the shape directory is 03 00 08 00 29 00 FC 01. You'd put your actual shape definitions immediately after this.

About poking the table in from Applesoft: First you have to take all those ugly hexadecimal numbers and convert them to base 10. Here are the equivalences:

Hex	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Base 10	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

The left digit in a two-digit hex number is the number of sixteens, so hexadecimal 23 is 2 * 16 + 3 = 32 + 3 = 35 in base 10. Another example: Hexadecimal C5 = 12 * 16 + 5 = 192 + 5 = 197 in base 10. If you don't want to do these conversions by hand, there's a program for number base conversion in this month's Basic Solution.

Once you convert all the values in your shape table to base 10, you can poke them into

sequential locations in memory. There are about 200 free bytes starting at location 768 (which is hexadecimal $300, or 3 * 256 + 0 * 16 + 0). The $ is the standard abbreviation for hexadecimal, although, with inflation, in a few years it will probably stand for base 15. (Ignore that last comment—just kidding.) The last thing you must do before you use the shape table, though, is poke locations 232 and 233 with the location of the beginning of the shape table, again in reverse order. So starting location 0300 is poked as 00 03, or:

```
POKE 232,0 : POKE 233,3
```

Now this should work okay. As you can see, shape tables, as they come now on the Apple, aren't exactly for the first-time user. Some good programs for getting started with graphics are *Complete Graphics System* from Penguin Software or a new one written by David Shapiro called *Amper-Graphics. Mark Pelczarski*

IF I need to speed up the computer system I have written for my medical office. The entire system is written in Apple III Business Basic and does everything I want it to, but it is slow at data production when we run the billing. I need some invokable modules; but my problem is that string locations in Basic are a secret. I realize they move, but I feel the speed would be enhanced if I could get to the string data in assembly language. I also realize that you can't extend a Basic string. *Raymond Sjerven, Kennewick, WA*

THEN Amazingly enough, there is actually a way to get at string data from a machine language module in Business Basic. And it's not too bad if you can get by with merely manipulating the existing characters, including changing them to blanks. What really gets hairy is when you actually want to change the legal length of the string. Changing the characters can be done "in place" in memory, but lengthening or shortening the string results in the creation of a new string somewhere else in memory with the release of the old string to "free" memory. That, in turn, may lead to garbage collection and involve just about the entire interpreter.

The more limited process of simple access to a string works as follows: Business Basic should already have created a string of the appropriate length in the usual manner. Then the address of the string is passed to the invokable module by the command PERFORM (@ mystring$). The address will be passed on the stack and also at $E8,9 on zero page, with the appropriate Xbyte at $16E9. This pointer, however, points to a "descriptor," not to the string itself. You now make use of what Apple calls the NOTNOW procedure, with the following declarations:

```
INDEX      .EQU    35
DISPATCH   .EQU    0E4
NOTNOW     .EQU    13. (decimal)
```

After popping and saving the return address, pop the descriptor address parameter directly to INDEX ($0E4,5). Then move the Xbyte from $16E9 to INDEX+1601. Next store #NOTNOW (decimal 13) at DISPATCH+3 and execute JSR DISPATCH. When the subroutine returns, the actual address of the string itself will be in INDEX and the string length in the accumulator. You can then handle the string by extended addressing off of INDEX. *John Jeppson*

IF One of the best features offered by Basic on many large computers is the relative ease of matrix algebra applications. The lack of a fast means of manipulating arrays in Business Basic is a real limitation. I have managed to overcome this in machine langauge on my Apple II Plus. If one of the Softalk Sages has any suggestions, I'd appreciate the advice. *David K. Magee, Jackson, MS*

THEN Business Basic could certainly use a good set of matrix manipulation procedures in an invokable module. With your experience in dealing with machine language arrays on the Apple II Plus perhaps you would enjoy creating such a module on the Apple III. You will, of course, need to use the Assembler from the Pascal system to create invokable modules for Business Basic. The Basic command PERFORM myprocedure (@ arrayvariable) will pass the address of your array to a machine language procedure in your invokable module. Two bytes of the address will be passed on the stack and also placed at $E8,9 on zero page. The appropriate Xbyte will also be placed at location $16E9. To access the array data you must use extended addressing as described in the *Program Preparation Tools* manual that comes with the Pascal system. Array elements are two bytes for integers, four for reals, and eight for long integers; all such arrays are sequentially organized in memory. *John Jeppson*

IF Is it possible to get around having only 64K available for string arrays in Business Basic? These limits to what one can manipulate in memory are frustrating, and the fact that all that memory is sitting there unused is devastating! *Harold Drob, San Francisco, CA*

THEN The 64K limitation on string arrays arises from the manner in which strings are stored and accessed in Apple III Basic. The location of each string is kept in a table, but the location number actually stored is an offset from the beginning of the string data area in memory. Each time a string is accessed, the offset must be subtracted from the base address of the string pool to find the actual address of the string. With an offset of two bytes (sixteen bits), the largest number of separate locations that can be specified is 64K. If the writers of Business Basic had chosen to make the offset three bytes long instead of two, much larger arrays would have been possible. But subtracting a three-byte offset from a three-byte base address would take a lot longer and would slow access for every string. The writers apparently chose speed over maximum size. *John Jeppson* ❑

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HO$$
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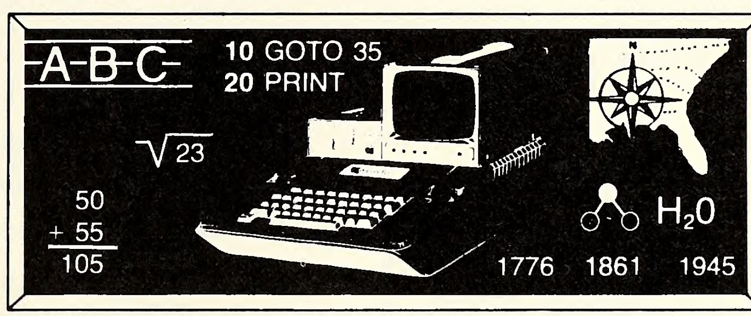

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Features: Compose, change, copy, print screen displays. Protected/unprotected data fields; 1-80 cols x 99 lines. Use stand-alone for data entry and retrieval displays. Apple II compatible computers; DOS 3.3; fp/int in ROM. Order from: Ed Minkler, 3237 Gibraltar Dr., Riverside, CA 92506. Price $49.

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COMPUPOINT SOFTWARE
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MATRIX II

Machine language extension to Applesoft adds matrix functions, saves programming time, executes *lightning fast*! Matrix multiply, TRN, INV, SYS, DET, NULL & much more. Easy to use. Includes disk with MATRIX II, demo programs & tutorial manual. Apple II+, 48K or IIe, DOS 3.3. $19.95. LRS Systems, 810 N. Seventh, St. Charles, MO 63301.

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If you have trouble understanding all those software codes that configure your printer, then this is the program for you. Just turn on your printer, boot the program and choose more than a dozen print types from the menu. We also include a preview of other functions available on the Gemini/Epson printers. Requires Applesoft, 48K and disk. Payment by check or money order. Send to DOWN AND OUT SOFTWARE, 33 Storm Drive, Holtsville, NY 11742.

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A program for modifying your Ultima II characters to survive Minax. Also, a program to make a backup copy of the Ultima II master disk and a tip sheet. Programs written in machine language. $29.95 + tax in N.Y.S. Outstanding Software Corporation, Dept. S2, 1174 Barnes St., Franklin Square, NY 11010; (516) 328-3433. Shipped 1st class. COD extra.

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Have *fast* machine language routines in *your* Applesoft programs. *Input anything*—enter those commas & colons from keyboard or disk. *Print Using*—print those amounts. *Ring Bell. Clear to End of Line. Clear to End of Page. Swap Variables*—make fast sorts. *Music*—notes & noise. *If/Then/Else*—put the *else* back in the *if/then*. *Wait*—for specific time. *Wait Key*—time or key. *DOS Free Space.* $29.95+$2 ship. Apple II+, IIe, DOS 3.3.

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Use your extended 80 column card to emulate a fast drive! Supports DOS 3.3 (254 sectors) and Apple Pascal 1.1 (125 blocks). RAMDRIVE can run 30 times faster than physical drives! Features audiovisual access indicators; menu driven documentation; copyable. Send $24.95 to Precision Software, 6514 N. Fresno Street, Milwaukee, WI 53224; (414) 353-1666.

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Are you tired of entering long "setup strings" to choose a print mode on your dot matrix? Our typeface program allows you to easily select a print mode with the touch of a key. Only $19.95 from DataCheck, 1749 Clearlake Ave., Milpitas, CA 95035; (408) 262-0498.

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Turns extended 80-column card into a 126 block RAM disk drive. Speeds up compiling, editing. Easy to use; files remain after rebooting; uses only 13 bytes of main memory. Source code included! $15.95. David Neves, 2801 Monroe St., #2e, Madison, WI 53711; (608) 238-0020.

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An APPLE assembler with ten-command text editor, two-pass RAM/disk-based assembly, free field programming, interactive operation, tutorial manual, and demonstration routines on disk. Apple II+, 48K, DOS 3.3 required. Send $23.50 + .50 P&H to: Thunder Software, P.O. Box 31501, Houston, TX 77231.

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A powerful program for AUTOMATIC printing of diskette labels showing FILES, DOS—sec free & used. Built-in default & escape functions, auto config. for printer slots & drives. Completely MENU driven. Req. no doc. Includes 300 5 in. labels. Req. 64K Apple II, II+, IIe disk dr., printer. Only $59.95 + $3 ship. NY res. add sales tax. Practical Software Ltd., Dept. ST, Box 3000, Pomona, NY 10970; (914) 425-1158.

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Don't spend big bucks for printing programs; PRINT MASTER does it all, prints business checks (checks sold at all banks), mailing lists, labels and envelopes all from file data! Powerful sorting features too! ONLY $29.95. NEW from SOFT-BYTE. P.O. Box 5701, Forest Pk., Dayton, OH 45405. (Info is free.)

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Introducing for use with Applewriter a unique WPL program to build WPL programs $24.95. Incl: WPL prog-builder, Zip code sort prog., program to search user-specified files for Wd/Item/Phrase. Plus complete printable doc. on disk and usable demo prog. Specify model. New Horizons, Box 4655, Medford, OR 97501.

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The word processor for professional typists and non-typist professionals is now available on the APPLE II (CP/M) for the amazingly low introductory price of $59. **PC Magazine** (April) says: "Because of its excellent manual and logical integration of printing, file-handling, and editing, this package is a good choice for personal or small office use."
(603) 456-2111 VISA or MASTERCARD
Eastern Mountain Software, Warner, NH 03278

EPSON FX-80 GLOSSARY FOR APPLE WRITER IIe

Confused about getting all the FX-80 print options to work when using Apple Writer IIe? Our EPSON GLOSSARY makes it easy! It's a small file that makes a big difference. Quality disk comes with glossary, sample AWII file, manual and free AWIIe "Cheat Sheet." $14.95+$1 shipping (NYS sales add sales tax). AEROCAL, Box 799, Huntington, NY 11743.

Apple III

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Apple III adv VisiCalc templates. Job cost—fee budget/analysis—project management. All on disk $29.95. Cost est. disk $19.95. Samples $5. Trent Manausa AIA, Box 4207, Tallahassee, FL 32315.

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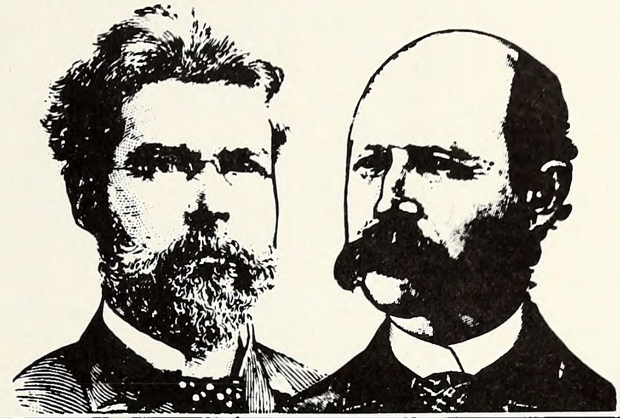
"New Improved" version of MERGE III allows Apple III owners to simply merge mailing and data into form letters. Uses the "hidden power" of Apple Writer III Word Processing Language on diskette or hard disk. $79.95. Send check or MO. Add $5 freight unless prepaid. *Kline's Production, Inc.*, 4501 Lindell Bl.-5J, St. Louis, MO 63108; (314) 367-7200.


Beagle

Heads Up! Exec



Beagle Bros™ MICRO SOFTWARE

by Matt Yuen

There are two ways to look at a Beagle Bros program.

One person might play with it awhile and say, "Jeepers! It's such a great idea, why didn't anyone think of it before?"

Another might say, "Who needs something like this, anyway?"

In answer to the second observer: Who needs a color television? Who needs a microwave oven? Who needs a computer? Answer: nobody. They're just nifty things to have.

And that's why Beagle Bros makes the programs it does—because they're nifty things to have. Not wonderful, not nice, but nifty.

To understand why Beagle Bros publishes programs like *DOS Boss*, *Utility City*, and *Apple Mechanic*, you have to understand Bert Kersey. And that's no small job.

How do you understand a man who has three clocks on his wall, showing the time in three different cities—San Diego, Fresno, and Seattle—all, of course, showing the same time ("If anything changes in those cities, we'll know about it")?

How do you understand a man who puts international symbols on the back of his disk envelopes telling you not to set disks on fire, feed disks to a crocodile, put disks in a toaster, fly disks like kites, or use disks

The gang's all here. A rare group shot taken on the penthouse level of the Beagle Bros Towers. From left to right: Tom Weishaar, Kristen Schwartz, Sophie, Bert Kersey, Sharon Kersey, Mark Simonsen, and Jack Cassidy.

to hold toilet tissue?

And how do you understand a man who puts trouser legs and shoes on the legs of his bed table?

You don't. People like Kersey are dangerous and should be avoided—unless you happen to own a computer. In that case, they're people we should be grateful for.

In its short three-year existence, Beagle Bros has made our Apples do tricks we didn't know were possible and made us laugh at things we didn't know were funny. Anyone who has ever seen a Beagle Bros ad, manual, or *Tip Book* knows what Kersey does in his spare time: He works full-time finding out things we didn't know we wanted to know.

Neither he nor his wife Sharon will let on whether it's really their beagle Sophie who writes all the software and documentation, and Sophie can't speak for herself (she's shy).

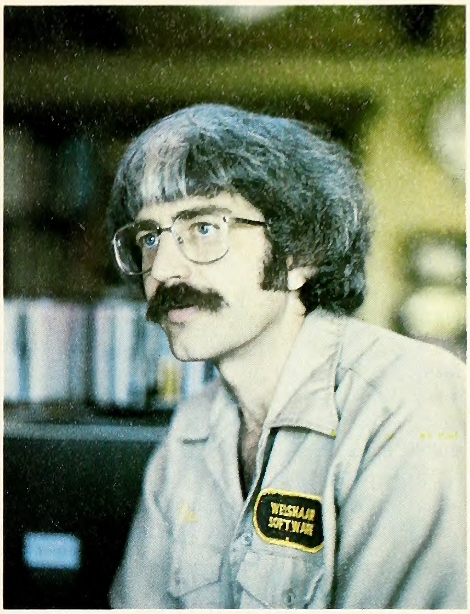
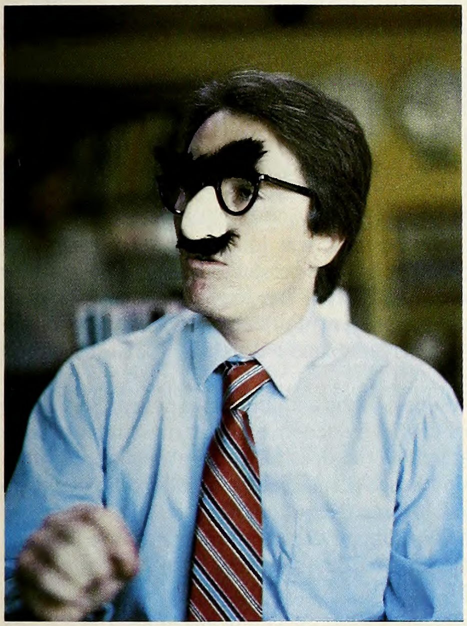
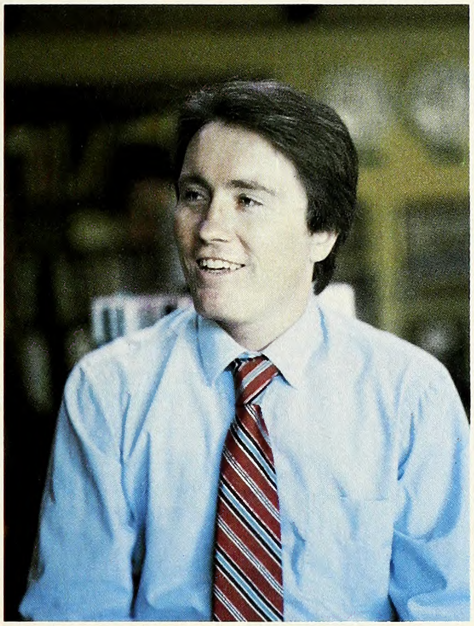
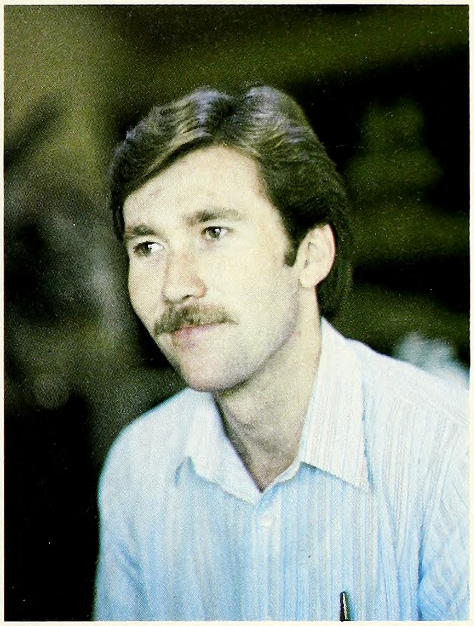
It may well be that Kersey (or Sophie) is the world's first software satirist. But he's not as nutty as he seems.

Is It Chips Yet? As a young man, Bert Kersey spent most of his life waiting for someone to invent the microcomputer. Contrary to what one might believe, he didn't spend all that time writing utilities for the computer that would be invented some twenty years later.

He was into *things*—electric trains, erector sets, gadgets, and widgets. The electric trains were his biggest passion. Even today, the molding in one of the hallways of his house is lined with trains on an oval track.

When it came time for college, Kersey took his trains with him to San Diego State University—if not physically, then at least in his heart. It



Opposite page: When asked why he wanted to get into the software business, Bert Kersey replies, "I'm not sure." The rest is history. This page (top row): Sharon Kersey says that, although she and Bert do a lot of the paperwork, it was a troop of her nieces who chipped, cracked, and broke their fingernails stuffing plastic bags with disks and manuals in the earlier days; Sophie does her part for Beagle Bros by taking everyone's naps for them; if Tom Weishaar ever starts his own software company, he'll begin with half of what he'll need—a company shirt. Bottom row: Convinced that *DOS Boss* has put him in the public eye, Jack Cassidy goes outside only if he's wearing a disguise; in this middle picture, he models his latest disguise; Mark Simonsen ("I'm just a normal guy. Huh? Yes, I work for Beagle Bros, but I'm not real crazy or anything. What's that? Look, I just help them with the phones and program for them, okay? No, I don't want to say anything funny, so leave me alone before I call a cop!").

was the trains that influenced his decision in selecting a major.

"I saw the word 'engineering' in 'electrical engineering,' and that's how I decided," Kersey says. Unfortunately, electrical engineering isn't a major that prepares people to drive electric trains; it prepares them for solving differential equations and staying up late at night. Grinding it out with electrical engineers didn't seem to agree with Kersey (he liked to sleep). So he soon switched to graphic arts, where he stayed for the rest of his college days.

After graduating, Kersey spent four years designing and putting together menus, signs, annual reports, and brochures for a restaurant company before deciding to solo as a free-lance artist.

When he wasn't at the drawing table, Kersey was off making movies. One of his movies that he especially remembers was a surfing film called *Seaweed Sandwich*. Though it sounds like something that would be shown on channel 17.5 at 4:00 a.m., the movie was originally made with profit in mind. Kersey's idea was to put together a montage of beach scenes, comprising a ninety-minute movie that would play at colleges and make a few bucks in the process.

"It should have been just twenty minutes long; it played twice and flopped," he recalls.

Seaweed Sandwich wasn't Kersey's only cinematic project. His other works include dozens of home movies, which went far beyond the usual relatives celebrating birthday parties. In fact, it's Kersey's experience in shooting and editing films that he credits for the way most of his Apple utility programs look on-screen.

Risky Business. Sharon Kersey wasn't exactly thrilled with her hus-

band's filmic endeavors. Because of her conservative upbringing, Sharon found it hard to accept Kersey's quitting his job and their moving to the beach for something that showed little promise.

"I'm glad we did it, though," she admits. "Even though it wasn't a practical decision, it was a challenge to take the risk; and if you don't take risks like that once in a while, life gets boring.

"It's more interesting to live in such a way that there's always new things happening," she says. "You don't know what's around the corner."

What was around the corner in 1979, however, almost exceeded Sharon's limits of "taking risks." That's when Bert discovered computers.

It was a Radio Shack TRS-80, and he wanted one. Badly. In typical fashion, he thought up almost every practical reason for having one: to do home finances, to do word processing, to monitor the house lights, to de-flea Sophie. In the final analysis, Kersey quit lying to himself and admitted the real reason he wanted one—just because.

Again Sharon expressed apprehension; to her, it just seemed like another expensive toy. And soon Bert also had misgivings about buying it.

"Darned thing broke down three times in two weeks," he recalls. "I

got my $600 back and bought an Apple."

Two days is usually the length of time it takes most people to become familiar with a new Apple. Two days is the length of time it took Kersey to decide to quit working as a free-lance artist and to start a mail-order software business.

Before going any further, he needed a name for his business.

Why Not Apple? "All the names with soft, data, and micro were already taken," says Kersey. "Besides, I wanted a name that people would remember. One of the things that popped into my mind was Walt Disney's Beagle Boys from the Scrooge McDuck comics, so I chose that."

The Disney company, however, has a habit of suing people who infringe, steal, or otherwise use its trademarks. Kersey had to find his company another name. That didn't pose much of a problem, even though he had already designed a Beagle Boys logo.

"I just changed b-*o*-*y*-s to b-*r*-*o*-s and I had a company."

For Apple users who have made the scene after *DOS Boss* appeared, it should be noted that Kersey—whose name is now almost synonymous with utilities—wasn't always into that sector of the software market. Games was the area where Kersey concentrated his early programming efforts. It only seemed like the natural thing to do; he liked playing games, so he tried his hand at writing a few.

"I didn't even know what a utility was in those days. I met Roger Wagner of Southwestern Data Systems and saw what a utility was. Utilities didn't look like much fun. The only other thing I knew about utilities was that people would call up Beagle Bros and ask if we had any."

Following what he learned about the mail-order business, Kersey placed an ad in *Creative Computing* for some of the games he had written. The ad carried the same lighthearted tone characteristic of the ads Beagle Bros runs today. (Asked which he likes more, writing programs or writing the manuals, Kersey replies, "Writing the ads.")

Kersey didn't know the Apple software market too well in those days. His system consisted of an Integer Basic Apple II and a cassette player, and he assumed everyone else's did too. After all, who in their right minds would opt for something called "Applesoft" and spend $600 on a disk drive? Ridiculous.

When orders started coming in, most customers requested Applesoft versions—on disk. That meant endless hours at the keyboard, converting the games from Integer to Applesoft and then putting them on floppies. Things only got worse when mail orders requested programs in some new thing called DOS 3.3.

"Remember, I was locked in my room all day. I had no idea of what was going on out there," says Kersey.

Bringing Home the Kibble. During the formative days of Beagle Bros, Sharon Kersey was the primary source of income for the family. About the time Bert was vying for an Academy Award with *Seaweed Sandwich* (he didn't win; the competition was a movie called *Patton*), Sharon had quit her job as a social worker with the county welfare department and started her own interior landscaping company.

Either eight years in that business was long enough for Sharon or Beagle Bros was getting too big for one person to handle. She and Bert decided that it might be nice for them to work together on the same project for once. Having spent the previous thirteen years taking turns supporting one another, the two agreed to make Beagle Bros a husband-and-wife effort.

Though Sharon handles most of the administrative duties, Bert is still as busy as ever. A typical day is divided up among programming, writing documentation, creating ads (he does all copywriting, typesetting, composition, and paste-up himself), and feeding Sophie, who claims to advise Bert when her steak is done. Kersey denies this.

The Other Boss of DOS. Though the true Beagle Bros are Bert and Sharon Kersey, one of the original Bros was Jack Cassidy, coauthor of *DOS Boss* and *Alpha Plot*.

The son of a Navy man, Cassidy spent the better part of his life following his father's military transfers around the country. With his roots in San Diego, Cassidy finally transplanted himself to Cornell University in Ithaca, New York. There he received his undergraduate degree in mathematics. Then he was set for a career in microcomputers, right? Wrong.

For whatever reasons people want to become writers, Cassidy stepped in that direction by enrolling in graduate school to study creative writing. He went to the University of Colorado, Johns-Hopkins, and the University of California, Irvine. If there were a University of Port Hueneme (his birthplace), he might have gone there too. His total number of years in graduate study? "About one," Cassidy says with a chuckle.

"I had my share of problems in graduate school; nothing out of the ordinary—things like money."

When he finally realized he wasn't cut out for the life of a graduate student, Cassidy returned to San Diego to do some serious work at S-Cubed as a nuclear reactor technician.

But any dreams Cassidy had of becoming a future nuclear physicist were shattered when he met Kersey.

The two were introduced by a mutual friend who knew about one man's love of his Apple and the other's expertise with computers. As Cassidy tells it, "Bert showed me his Apple, and I was amazed at all the stuff it could do. He let me borrow it, and it just blew my mind how this little teeny machine could do all these things my three-million-dollar computer at work couldn't do."

Like what? "It could play music. The Apple could do graphics in-

stantly. For the computer we used at S-Cubed, you had to write algorithms, input them, wait, and then wait some more. A real hassle. With the Apple, you just type it in and it's there."

Things began taking shape. A path began to wear between the Cassidy and Kersey residences, mostly in one direction. Jack continued to fool with Bert's computer, while Bert was putting together *Game Pack #1*.

What do you do when your friend is hogging your computer all the time? Bert couldn't kick him off; after all, it was for the good of the company. Solution: Kersey bought an Apple for Cassidy.

It wasn't because Bert was just a swell kind of guy, but so Cassidy could do all his work at home. "That situation didn't last very long," says Cassidy. "The next day, I bought it from him."

Found: One DOS, Near Main Ram; Does Tricks. About that time, Beagle Bros's *Game Pack* was selling well enough to make it worth the upstairs commute to work every morning. But then Kersey began fooling with disk drives.

Kersey is a curious and inquiring man, always experimenting, trying to make his Apple do weird things. As most Apple hobbyists do every now and then, he would try out poking random values into random locations, just to see the result. He even wrote a program that could print out

The Beagle Bros general accounting system: Each disk sticker represents 100 sales. Lots of stickers means business is good. No stickers means business is not good.

the contents of the Apple's memory wherever it found ASCII characters. From this, he discovered a list of all DOS commands.

"I remember Bert saying, 'Hey, this is funny. What's it all mean?' " says Cassidy.

Then, one afternoon, for reasons that are unknown to this day, Kersey came out of his computer room and picked up a magazine.

"I read that it was possible to change the way DOS commands are worded." The two then sat down, changing DOS commands and poking in values at various locations, just to see what would happen.

"Most of the time the computer would hang and we'd have to reboot," says Kersey, "but about every fiftieth try or so, something interesting would happen. We'd look at it, smile, write it down, and continue."

The completion of *DOS Boss* took about three months, a time during which Cassidy thought about quitting his job at the nuclear plant. In November 1981, *DOS Boss* debuted at number three on the *Softalk* Hobby 10, and Cassidy quit his job.

Just a few months later, the two co-wrote *Alpha Plot*, a graphics and hi-res text utility, which hit the Hobby 10 in March 1982. That was Cassidy's last Beagle program.

By then, things really began cooking. The company took up most of Kersey's time, and Cassidy realized there wasn't too much that he and Kersey could work on together; Kersey liked Basic, and Cassidy didn't.

"Basic makes my back hurt," says Cassidy. "I also have a bad memory, and Basic always requires you to remember all those variables and line numbers.

"Bert and I still toss around ideas of what we might do in the future. With Apple's ProDOS coming out, I'm sure I'll be doing a lot of modifications to *DOS Boss*."

Cassidy is still his own man, doing free-lance work for other publishers. One of his programs is *B-Fast*, a B-tree programming utility for Pascal fans, which is being published by Datamost. Another is *Megafinder*, a Pascal database management program from Megahaus.

Roll Over, Sophie—Now! Whereas Cassidy takes to the "serious" programming languages for their aesthetic value, Kersey absolutely abhors them. When it comes to programming, he's too impatient to learn assembly language, which is strange for a person whose *Tip Books* are full of hints on how to make programs run faster and jump higher.

Kersey avoids assembly for the same reason that he got out of the photography business—too much time is spent waiting.

"In assembly language, you have to write your program, run it, debug it, reassemble, and run it again. It's like waiting for your prints to come back from the photo lab," he explains. "I like the way Basic lets you make a change and see it immediately."

With this attitude, Kersey plodded along in Applesoft, coming up with bestselling utilities like *Utility City* and *Apple Mechanic*. *Utility City* was a collection of twenty-one programs on one disk; *Apple Mechanic* contained ten utilities and several other tasty delights.

Once in the hands of hobbyists, these wonders let users format Applesoft listings, put invisible commands inside programs, format catalog listings, create tricky file names, create shape tables, customize typefaces, combine text with graphics, rewrite bytes on disk, and do just about anything else Kersey's mind could concoct and churn out. All in Applesoft, all unprotected, and all listable.

Most Beagle Bros programs are meant to be teaching tools for Applesoft programmers. In fact, several programs on *Tip Disk #1* encourage the customer to list the program before running it to see what makes it tick. This is extremely helpful when you run into one of Kersey's devilish ditties, the sole purpose of which is to baffle and confuse.

Beagle Bros programs have been unprotected from day one, and piracy has had little to do with that decision.

"Protecting software is a waste of time," says Kersey. "Copy-protection schemes that work today are just going to be broken next month, and the whole process of developing schemes takes too long.

"Besides, none of us knows how to do it."

Neither the Experienced nor Inexperienced Need Apply. If that last remark prompts potential protection scheme writers to apply for a job with Beagle Bros, forget it. Other than Bert and Sharon Kersey, the company has never had any full-time employees, and it's been happy that way. Things are changing now, though; Beagle Bros's growth is becoming too much for the Kerseys to handle.

"We're actually considering taking on employees to help with a lot of the paperwork," says Sharon.

Kristen Schwartz, Bert's niece, is probably the closest thing they have that resembles an employee. Under the Beagle alias of Minnie Assembler, Kristen is the one who handles all the company's mail correspondence. Customers might notice that, on product registration cards, the Beagle mail department is said to be headed by Flo Chart. "That," Kristen points out, "is a lie. Flo is nothing more than a woman on a poster in the Beagle office whose belly button lights up at two-second intervals."

The only other semiemployee is Mark Simonsen, creator of *Flex Text* and *Double-Take*. When he's not trying to think up new ways to use his programming skills to impress Kersey enough to give him a raise, Simonsen is the person you talk to when you phone the company. Whether it's a technical question or one about submitting programs for possible publication, he's the one who saves Kersey the trouble of picking up the phone and saying, "Gee, I dunno. Phone Apple and ask for Steve."

Like the way Kersey waited for computers to be invented, Simonsen waited for a company like Beagle Bros to be founded. After receiving his bachelor's degree in computer science from Brigham Young University, Simonsen jumped right into the working world, nabbing a job at GTE. Writing telecommunications software is a far cry from creating programs that let your Basic listings scroll up and down, but it paid well and offered nice benefits.

Apples were nothing new to Simonsen, who had used them extensively at BYU since 1978. In October 1981, he bought his own Apple, with the idea in mind of writing programs for publication.

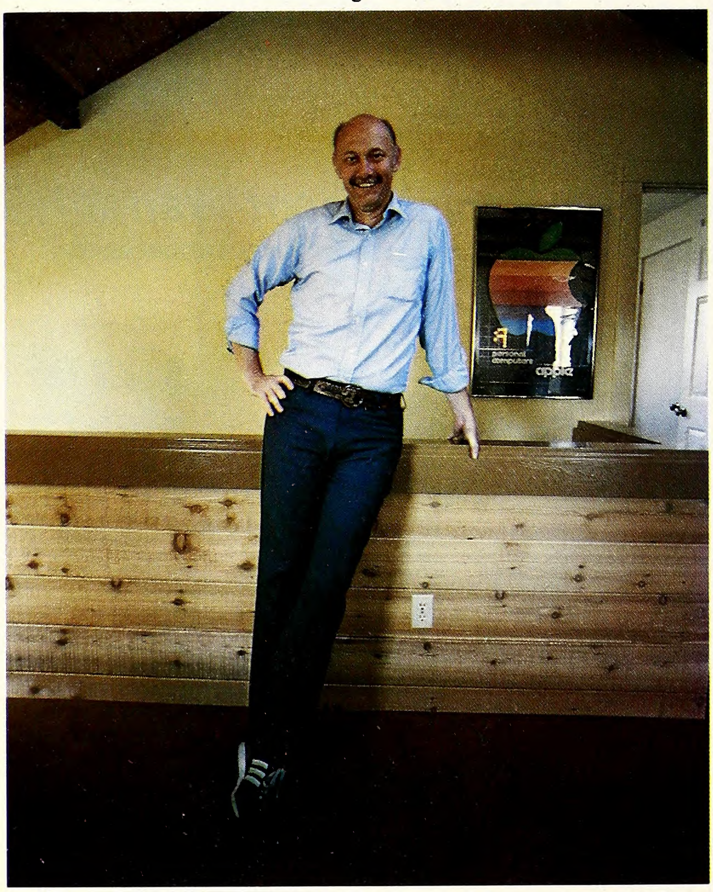
I Can Do That. "My first idea was to write a superduper DOS program that would allow you to modify DOS commands and messages to be what you wanted them to be. Then I found out about a program called *DOS Boss* that already did that," Simonsen remembers.

"Next, I saw On-Line's *SuperScribe* (*Screen Writer II*) word processor and how it let you format your text in various column widths; I wanted to do something like that for Basic programs."

Simonsen contacted Sierra On-Line and submitted his program. He and the Coarsegold publisher corresponded several times before his program was rejected. Then Simonsen contacted Sharon Kersey, who suggested that he submit a demo of his program, along with documentation.

"I wasn't ready at all. I said, 'Fine,' and hurried to write the documentation, since there wasn't any."

Now, he needed a demonstration program. Anxious to impress his potential publisher, Simonsen borrowed a copy of *DOS Boss* from a friend, looked at the demo, examined the program listing, and tried to write one that carried the same Beagle flavor. It worked.



"One of the things that caught Bert's eye right away was my demo program. He told me facetiously that he wished he could write demo programs as well."

With that, *Flex Text* was born, taking its place on the Hobby 10 after only one month on the market.

About the same time Kersey was chuckling over Simonsen's *Flex Text* demo, Tom Weishaar—as the latest *Beagle Bros Bulletin* puts it, "That's pronounced, 'Weishaar' "—was signed up as another Beagle contributor.

While the path Kersey took to the computer business was a convoluted one, Weishaar's was even more circuitous. He went to India first.

Don't Shoot Me; I've Got Programs To Write. In the late sixties, Uncle Sam was yanking kids by the ear to serve time in Vietnam. Weishaar, a man quite fond of his ears as well as the rest of his body, applied to the Peace Corps.

Not too long after that, he found out that the Army wasn't interested in his ears and he wouldn't have to go. That bit of news had him so happy that he totally forgot his pending application to the Peace Corps.

"Right about then I was jilted by this girl I was seeing, and when the Peace Corps called and asked if I'd like to go to India for a few years, I said, 'Heck yes!' "

Originally sent there to teach modern agriculture techniques to Indian farmers, Weishaar found those two years to be an invaluable experience he'd recommend to everyone.

"One-third of my life was growing up and going to college. Another third was two years in the Peace Corps. And another third was everything I've done since then."

Weishaar's background seems hardly a foundation for a life in microcomputers: a bachelor's degree in English, radio, television, and film from the University of Iowa; the Peace Corps; his years spent working in his father's farm-equipment business; a master's degree in journalism from the University of Kansas; a stint at the Commodities News Service, a wire service for farmers, where he was the editor of *Cotton Trade News*. Though his interest in computing stemmed from his hand in the videotex industry, Weishaar's primary reason for getting a computer was similar to Kersey's.

"Some people buy speed boats, some buy campers; I wanted a computer."

The system Weishaar started with was a 16K Integer Apple and a modem. No disk drive, no monitor, no printer; it was planned that way for quite some time.

"When we bought our house, I designated the dining room as the future computer room. So, for eighteen months, the dining room didn't have a piece of furniture in it."

Some people make room for babies, and others . . . well, the Weishaars are just that kind of family.

After learning Basic and assembly language on his own, Weishaar wrote *Frame-Up* and knew just who he wanted to publish it.

"I examined my own philosophies about the software industry and looked for a company whose philosophies matched. I liked Beagle Bros's ads, and their sense of humor was much like my own," says Weishaar. "We also both feel strongly about keeping software inexpensive and unprotected."

He concedes that "piracy is a big problem that is killing the industry," but that "protection schemes aren't the answer."

No Bad Dogs, the Beagle Way. If there is an answer to solving the piracy problem, Beagle Bros seems to know the general area in which it's buried. Despite their lack of protection schemes, Beagle programs continue to sell. In the September *Softalk* Top Thirty, Beagle Bros placed five titles. In the Hobby 10 category, it held seven slots. (Kersey points out that with such a saturation of Beagle utilities, the category should be changed to Utility 10.)

Even *Beagle Bag*, a collection of twelve games from the early Kersey era, broke into the Arcade 10 in August. "It can't really be classified as an arcade game, but where else could you put it?" quips the games' author.

There seems to be a pattern developing here: low prices, unprotected disks, good quality, trust in consumers, and amusing manuals. This is just part of what kept *DOS Boss* on the bestseller charts for twenty-one of the past twenty-three months.

The pattern continues. Beagle Bros has acquired *Global Program Line Editor* (*GPLE*) from Synergistic Software and is now publishing the already bestselling utility. Unprotected and at a lower price.

None of the Beagle programmers have any permanent bonds to the company, but they do have things in the works.

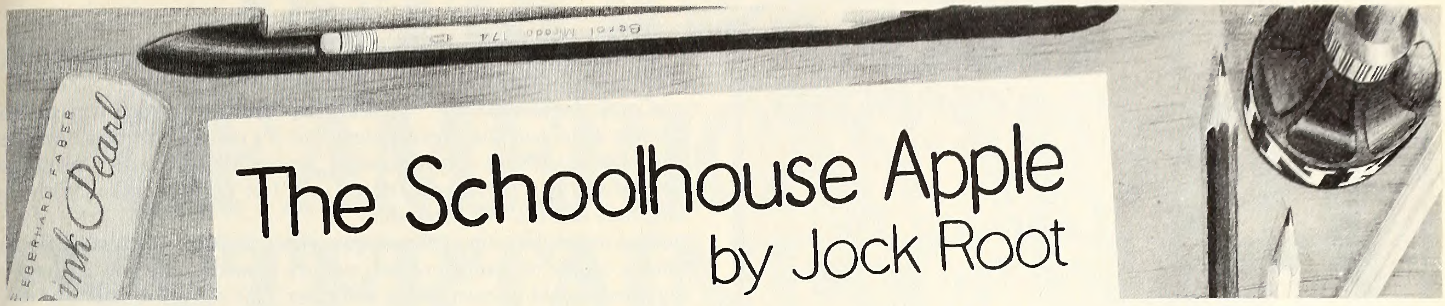
Cassidy's current project is a book that will contain answers to popular adventure games, including *Time Zone*. "People can read the book to find out how the adventure turns out, thus saving them countless hours at the keyboard," he jokes. "The *Time Zone* solution will be on six double-sided pages." The book will be published by Datamost.

Not to be outdone, Weishaar is currently working on a book for beginners. "No programming. Just simple stuff like how to use *Fid*, how to back up files, and how to press keys."

When he's not on the phone telling people how to get warm root beer off their *Flex Text* disks, Simonsen is working on a graphics disk for Beagle Bros.

In a fast-growing software industry that claims to be busting out of the cottage and heading for the glass-and-steel skyscrapers, Beagle Bros is thumbing its nose at that attitude by keeping things small. And fun.

Especially fun. ∎



The Schoolhouse Apple
by Jock Root

We talk about computer literacy a lot. We praise it as a shining goal and rebuke ourselves for not having enough of it. Some of us think that being computer-literate is the answer to society's problems; others consider it a necessary attribute of any civilized person—like being able to dial a telephone (remember dial telephones?) or drive a car (remember shifting gears?). Wonderful stuff, this computer literacy; but what exactly *is* it?

An earlier generation (less than ten years ago) called it "computer awareness"—the generation before that would have called it "computer hipness" if they'd known about it. The general idea is computer familiarity—being comfortable around a computer and capable of using it as a tool.

A curious thing about that phrase, "computer literacy." It has the ring of an outsider's label. Somehow it's a term you apply to "them," not to "us." If you're a computer-literate person yourself, you probably don't think in terms of "literacy" (except, maybe, in talking to outsiders). If you think about it at all, you think of it as understanding or skills.

Consider this phrase from the viewpoint of the victim—the one who is to be stuffed with computer literacy. You can imagine teachers sitting still for it, because they think it's their duty; but a kid will say, "Literacy? No way! I'd rather play *Zaxxon*!"

But when you offer a child understanding (say, "how to work the computer"), or even just familiarity (say, "You want to try it?"), you'll probably get a different response. After all, children are very practical; and understanding is something you can *use* while literacy is only something other people see when they look at you.

This concept of computer familiarity could be expressed as being able to talk to the computer in its own language—or one of them anyway. The nice thing is, a computer can speak many languages, from Pascal and Fortran (obscure) to Basic (fairly simple) and the control language of your favorite word processor, game, or whatever (probably complex, but human-oriented). Being able to understand any one of these languages would qualify you as being comfortable with computers, which is what it's all about.

So maybe we should call it "computer fluency."

Kidstuff. A new book, Anna Mae Walsh Burke's *Microcomputers Can Be Kidstuff*, is a lovely example of the insider's approach to computer fluency. It's a guidebook on getting acquainted with your first microcomputer, and it's got all the right stuff in it—warnings and reassurances, instructions and suggestions. The unusual thing about this one is, it's written specifically for children.

The author is a fully qualified "insider"; she's been a programmer since 1960, when there were only a couple of thousand computer installations in the whole country. It's very unusual for a person with that kind of background to write a good book for beginners—the expert usually has a hard time seeing things from the beginner's viewpoint, but this book is an exception. This author understands a beginner's perspective very clearly, and the book's dedication explains why: The book is dedicated to her children.

The book is a sort of "user's companion," a collection of all the things a beginner needs to know (such as how to turn the system on, how to handle disks and cassettes, and so on), a discussion of things that can be done with a micro, an introduction to Basic and Pilot, and a collection of sample programs to mess around with. There is also a section on history, from Pascal's Engine to the sixties—the Age of Dinosaurs, as someone has called it.

Burke's expertise is not limited to dinosaurs: She has both an Apple II and a Radio Shack Model II. That gives her a broader viewpoint than most people have.

For a beginner's book, this one goes a long way. It covers obvious things, like copying a disk or tape, and less obvious things, like documentation. There's even a section covering what you need to know to buy a program, the kind of detail most books forget to mention.

There's a chapter on program design, which is both simpler and more advanced than some adult treatments. It covers flowcharting, algorithms, structured programming, scientific notation, constants and variables, arrays, loops, debugging—all in clear and simple terms, with the emphasis on doing it yourself.

There's also a chapter on Basic, which uses the same straightforward and simple approach to teach some fairly complex programming skills, such as the use of conditionals, subroutines, and loops. The example programs include several math routines, a poker game, and a program that writes poetry.

The author's background gives the book a comfortable balance between fun and business. On the one hand, the approach is always immediate and specific—"Here's how to do it," but, on the other, there's a whole chapter on flowcharting, with the message "Look before you leap." The last chapter in the book is titled "Rules for My Own Computer." For all its youthful eagerness, this book has the air of a disciplined professional about it.

George Bernard Shaw said, "What a wonderful thing is youth—what

a sin to waste it on children!" The same could be said about this book: There are not many adult books as good.

ComputerTown. The "insider's approach" is a good way to promote an understanding of computers, but it's not the only way. Another new book describes a very successful "outsider's approach": the classic American town meeting pattern, or "Let's get together with the neighbors and find out about this!"

The original ComputerTown got started in Menlo Park, California, when a couple of computer-book authors wanted to see how a group of beginners would interact with a computer. The writers took one of their computers to a local school and started giving classes once a week; before long, students were asking to be allowed to use the system between classes. Eventually space was set aside in the public library, where several computers and a collection of software were made available for use by the whole community.

This "public access computer project" grew so popular that the National Science Foundation became interested and provided funds to develop a detailed model of the Menlo Park project as a guide for other communities. There are now hundreds of ComputerTown projects around the country, quite a few in Great Britain, and others in Canada, Europe, and Africa.

The book, *ComputerTown*, by Liza Loop, Julie Anton, and Ramon Zamora, is the latest version of the Menlo Park model—a detailed handbook on starting a ComputerTown project in your own community. This is not a collection of visionary ideas but a set of practical techniques based on experience—a "how-to" book.

It starts, as you'd expect, with advice on planning and organization, but the accent is on flexibility, not detail. To get started, all you need are a few good people, a physical location, and access to at least one microcomputer. The book makes the point that "due to their informal nature, ComputerTowns often take on lives of their own." It suggests that you "plan what you would like to see happen and adjust the plans as things develop."

There's a chapter on offering events—various ways of introducing the community to your ComputerTown. Another chapter covers courseware and instruction, addressing such issues as what kinds of software to have available, how to introduce beginners to programming, how to set up "peer teaching" (in which the more advanced beginners teach the less advanced), and so on. There's an appendix on taking care of equipment and another on resources.

Perhaps the best way to summarize this book is by saying that, as you read it, you'll find yourself filling in the names of people and places in your own community and thinking how easily the ComputerTown approach could work there.

A Really Practical Guide. The "computer-literacy" problem that most educators worry about is not the local community, and it's not the students: It's the teachers themselves. If teachers are to lead the rest of us into the Land of Literacy, they must first have some knowledge themselves. So here's a resource guide for teachers: the *Practical Guide to Computers in Education*, by Coburn and others, from Addison-Wesley.

This book is presented as the first in a series, and a very thorough effort it is. It answers most of the questions you are likely to think of, from hardware to software, from classroom to administration, from pedagogy to system maintenance, from practice to philosophy. Never mind the details—it's a big book.

In addition to being stuffed with information, the book is fun to read. Most of the examples are in the form of descriptive vignettes, or anecdotes, which make for a pleasant break in the steady flow of information; and, while the authors take their subject seriously enough, they don't take it *too* seriously.

If you're a teacher, your department has a new computer, and you want to spend all your budget on software and get only one book, this is probably the one you should get.

Seminars and Conferences. Oklahoma State University is holding its third annual Microcomputers in Education conference on November 18 and 19. This is a training conference for teachers in what is becoming the standard format. It will include papers, software and hardware demonstrations, hands-on time, and discussions with vendors and other experts. It will cover elementary, secondary, postsecondary, and special education, as well as teacher education and educational administration.

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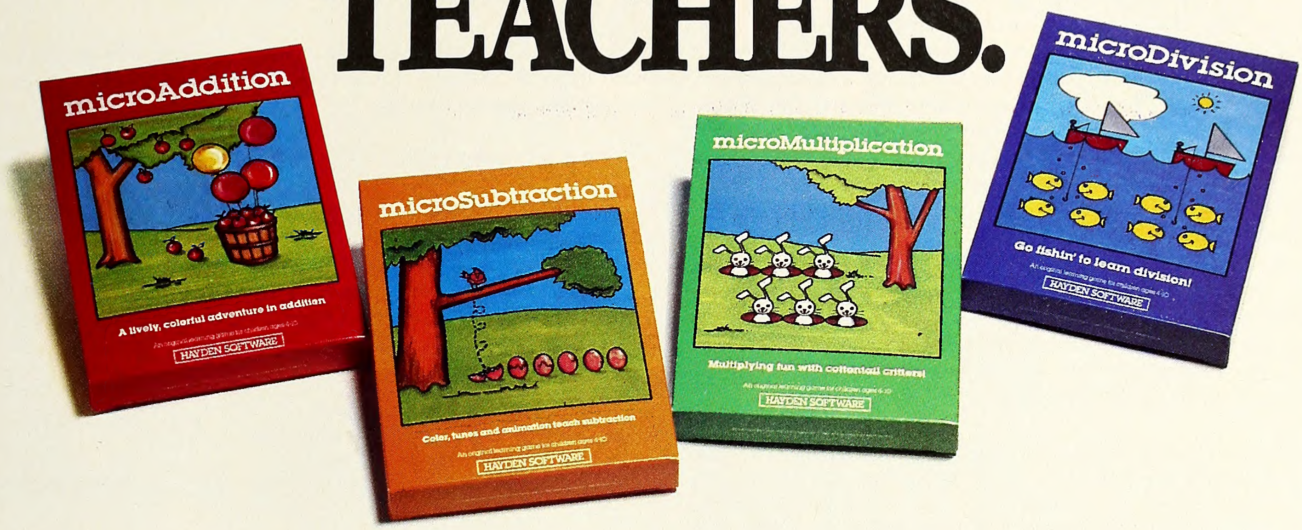

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The National Council of Teachers of Mathematics is sponsoring a series of similar programs, which they call seminars. These seminars will take place in Winnipeg, Manitoba, October 6–8; Atlanta, Georgia, December 7–9; Las Vegas, Nevada, January 23–25; and Miami, Florida, May 16–18. They will have substantially the same features as the University of Oklahoma conference events, with a focus on elementary, intermediate, and secondary school mathematics.

Attending conventions like these can be intense, but the experience may take you halfway to computer fluency in a single stride. In fact, here's an unofficial recipe for "14 Days to Computer Literacy": Start with a few days of access to a local computer to dissipate the encounter shock; then go to a conference like one of these; then return to spend a week or so with the local system (and your choice of software)—and you'll be talking to the computer like an old buddy.

One more thing. If you're an educator working in the neighborhood of Toledo, Ohio, you might want to check in with CLUE, the Computer League for Users in Education, a local user group with a membership of one hundred fifty or so. They put out a quarterly newsletter, which contains news of local computer classes and activities, and they maintain a resource group to answer telephone questions about resources, local networking contacts, and general advice (phone numbers are in the newsletter). It can be very comforting to know that you have a group of experts within such easy reach.

So, whether we call it computer literacy or fluency or simply familiarity, we seem to be getting a handle on the matter. It won't be settled until computers are as common (and as inexpensive) as television sets, but, judging from the example of the hand calculator, that won't be long. And when that happens, nobody will talk about computer literacy any more—we'll all be too busy doing it!

Computer League for Users in Education, 1816 Harlan, Toledo, OH 43615; (419) 536-6803 or 531-1648. ComputerTown, Box E, Menlo Park, CA 94025; (415) 323-3111. ComputerTown, *by Liza Loop, Julie Anton, and Ramon Zamora, Reston Publishing Company, 11480 Sunset Hills Road, Reston, VA 22090; (703) 437-8900.* Microcomputers Can Be Kidstuff, *by Anna Mae Walsh Burke, Hayden Book Company, 50 Essex Street, Rochelle Park, NJ 07662; (201) 843-0550. National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091; (703) 620-9840. Oklahoma State University, Department of Curriculum and Instruction, 302 Gundersen, Stillwater, OK 74078.* Practical Guide to Computers in Education, *by Peter Coburn, Peter Kelman, Nancy Roberts, Thomas Snyder, Daniel Watt, and Cheryl Weiner, Addison-Wesley Publishing Company, Reading, MA 01867; (617) 944-3700.*

The Voice of THE TURTLE

A Schoolhouse Apple Tutorial

LOGO

DONNA BEARDEN

Once upon a time there was a cheerful and obedient turtle who was all too happy to draw and draw and draw. But he was just as interested in reading poetry and adventure stories and maybe even trying to write some himself. So one day he put his drawing pens on the shelf and got out his nouns and verbs and his PRINT command. And he set to work one step at a time to create a program that would be fun, maybe a little silly, and one that could be useful in teaching parts of speech.

These procedures were written in Apple Logo and used the commands PRINT, SENTENCE, READLIST, and MAKE. RANPICK, a procedure from the *Apple Logo Reference Manual*, is used to select a random item from a list. Each command will be briefly explained with examples for those who are just beginning to explore this "other aspect" of Logo.

PRINT is a command that tells the computer to print something on the screen. Enclose what you want it to print in brackets. Try a few.

```
PRINT [MY NAME IS RUMPELSTILTSKIN]
PRINT [TODAY IS MY BIRTHDAY]
PRINT [](Use this if you need a blank line.)
PRINT [BIG DEAL! IS THIS ALL IT WILL DO?]
```

If you're thinking big deal, you're ready for the next command. The PRINT command by itself isn't so hot, but start putting it in some procedures and combining it with other commands and it can become very useful.

SENTENCE is a command that combines words and lists. For example, if you type:

```
PRINT SENTENCE [WHERE ARE YOU GOING] [FOR LUNCH
    TODAY?]
```

the computer will combine the two lists into one sentence.

PRINT can be abbreviated PR and SENTENCE can be abbreviated SE.

```
PR SE [ROSES ARE RED,] [BUTTERFLIES ARE FREE]
```

Sometimes you will have three or more lists or words you want combined into one sentence. In that case you will have to enclose the command in parentheses like this:

```
PRINT (SENTENCE [WHERE IS] [ALL THIS] [LEADING TO?])
```

PRINT and SENTENCE become a lot more interesting when they are used with READLIST. This command enables you to begin creating interactive programs, which call for some kind of response from a user. For example, the following procedure combines the user's inputs, name and hometown, into sentences that make it seem like the computer is carrying on an intelligent conversation.

```
TO CONVERSE
PRINT [WHAT IS YOUR NAME?]
PRINT SENTENCE [HELLO,] READLIST
PRINT [WHERE ARE YOU FROM?]
PRINT SENTENCE READLIST [IS A GOOD PLACE TO BE FROM!]
END
```

MAKE is a command that is a lot easier to use than to explain. It requires two inputs; the first is the name of the variable, the second is the value. It is very helpful when used with the READLIST command because it enables you to store the user's input under a certain name and then call it back whenever you want. For example, we are going to develop a couple of semioriginal poems by plugging some crazy inputs into a very familiar nursery rhyme.

First, here's how MAKE is used in the procedure:

```
PRINT [NAME A BOY]
MAKE "BOY READLIST
PRINT SENTENCE [LITTLE BOY] :BOY
```

If the user types in NAYLOR when the computer says to name a boy, the computer will store "NAYLOR" under the name BOY. In the PRINT SENTENCE line, the computer will combine LITTLE BOY with the input for :BOY and will print LITTLE BOY NAYLOR.

Here is the computerized version of "Little Boy Blue." (Don't type it in just now; we'll have a chance at the end of the article to see these routines again.)

```
TO LITTLEBOY
CLEARTEXT
PRINT [NAME A BOY]
MAKE "BOY READLIST
PRINT [NAME A MUSICAL INSTRUMENT]
MAKE "INSTRUMENT READLIST
PRINT [NAME AN ANIMAL]
MAKE "ANIMAL READLIST
PRINT [NAME A PLACE OUTDOORS]
MAKE "OUTDOORS READLIST
PRINT [NAME ANOTHER ANIMAL]
MAKE "ANIMAL2 READLIST
PRINT [NAME ANOTHER PLACE OUTDOORS]
MAKE "OUTDOORS2 READLIST
PRINT [WHERE DO YOU LIKE TO HIDE?]
MAKE "HIDE READLIST
WAIT 30
CLEARTEXT
```

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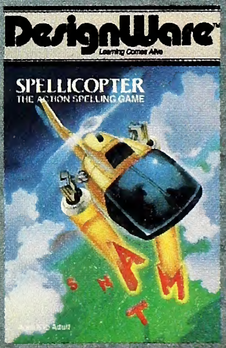

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```
PRINT [HERE'S YOUR ORIGINAL POEM!]
WAIT 50
PRINT []
PRINT []
PRINT SENTENCE [LITTLE BOY] :BOY
PRINT SENTENCE [COME BLOW YOUR] :INSTRUMENT
PRINT (SENTENCE [THE] :ANIMAL ['S])
PRINT SENTENCE [IN THE] :OUTDOORS
PRINT (SENTENCE [THE] :ANIMAL2 ['S])
PRINT SENTENCE [IN THE] :OUTDOORS2
PRINT [WHERE IS THE BOY]
PRINT SENTENCE [WHO LOOKS AFTER THE] :ANIMAL
PRINT SENTENCE [HE'S] :HIDE
PRINT [FAST ASLEEP]
END
```

Stacy, who is eight, came up with the following:

Little Boy Naylor come blow your piccolo.
The tiger's in the park,
The lion's in the swimming pool.
Where is the boy who looks after the tiger?
He's in a closet fast asleep.

Here's the beginning of "'Twas the Night before What???" You'll have to complete it yourself, but don't do any typing just yet.

```
TO STORY
CLEARTEXT
PRINT [NAME A HOLIDAY]
MAKE "HOLIDAY READLIST
PRINT [NAME A BUILDING]
MAKE "BUILDING READLIST
PRINT [NAME AN ANIMAL]
MAKE "ANIMAL READLIST
PRINT [NAME AN ARTICLE OF CLOTHING (PLURAL)]
MAKE "CLOTHING READLIST
PRINT [NAME A FAMOUS PERSON]
MAKE "PERSON READLIST
PRINT [NAME A PIECE OF FURNITURE (PLURAL)]
MAKE "FURNITURE READLIST
PRINT [NAME SOMETHING SWEET]
MAKE "SWEET READLIST
CLEARTEXT
PRINT [WAIT A MINUTE WHILE I PREPARE]
PRINT [YOUR ORIGINAL COMPOSITION...]
WAIT 100
CLEARTEXT
PRINT SENTENCE ['TWAS THE NIGHT BEFORE] :HOLIDAY
PRINT SENTENCE [WHEN ALL THROUGH THE] :BUILDING
PRINT [NOT A CREATURE WAS STIRRING]
PRINT SENTENCE [NOT EVEN A] :ANIMAL
PRINT SENTENCE [THE] :CLOTHING
PRINT [WERE HUNG BY THE CHIMNEY WITH CARE]
PRINT SENTENCE [IN HOPES THAT] :PERSON
PRINT [SOON WOULD BE THERE]
PRINT [THE CHILDREN WERE NESTLED]
PRINT SENTENCE [ALL SNUG IN THEIR] :FURNITURE
PRINT SENTENCE [WHILE VISIONS OF] :SWEET
PRINT [DANCED IN THEIR HEADS]
END
```

Stacy's story began like this:

'Twas the night before April Fool's Day
When all through the Empire State Building
Not a creature was stirring
Not even a shrew
The hats were hung by the chimney with care
In hopes that Judy Blume soon would be there
The children were nestled
All snug in their lamps
While visions of candy
Danced in their heads

Try picking out key words from other poems and making up your own procedures.

Once you've mastered the "semioriginals," you might like to try your hand at random composition. In random composition, we'll give the computer a list of adjectives, nouns, verbs, and adverbs and it will randomly put them together to make silly sentences.

RANPICK is a procedure from the *Apple Logo Reference Manual*. It prints a random element of a list.

```
TO RANPICK :LIST
PRINT ITEM (1 + RANDOM COUNT :LIST) :LIST
END
```

If you say:

```
MAKE "NOUNS (BOYS GIRLS DOGS CATS HORSES]
```

And then give the command:

```
RANPICK :NOUNS
```

the computer will respond by randomly picking one of the items from your list of nouns.

In order to allow users to make up their own nouns, the following procedures were defined:

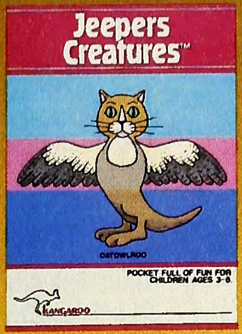
```
TO NOUNLIST
PRINT [NAME FIVE PLURAL NOUNS]
MAKE "NOUNS READLIST
END

TO NOUN
RANPICK :NOUNS
END
```

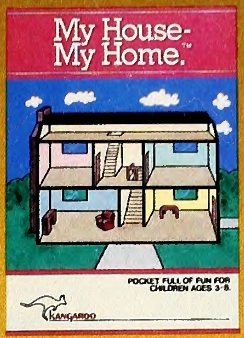
Similar procedures were defined for verbs, adjectives, and adverbs. SILLY was defined to combine a random adjective with a random noun with a random verb with a random adverb. It comes up with something, well . . . silly!

COMPOSE was defined to put all the procedures together so the user could compose lots of silliness. Here's the entire program; it appears again later on.

```
TO COMPOSE
ADJECTIVELIST
NOUNLIST
VERBLIST
ADVERBLIST
WAIT 30 CLEARTEXT
SILLY
PRINT []
SILLY
PRINT []
SILLY
PRINT []
PRINT [TYPE "SILLY"]
PRINT [IF YOU WANT TO SEE ANOTHER ONE.]
END

TO ADJECTIVELIST
PRINT [NAME FIVE ADJECTIVES]
NAME "ADJECTIVES READLIST
END

TO ADJECTIVE
RANPICK :ADJECTIVES
END

TO NOUNLIST
PRINT [NAME FIVE PLURAL NOUNS]
MAKE "NOUNS READLIST
END

TO NOUN
RANPICK :NOUNS
END

TO VERBLIST
PRINT [NAME FIVE VERBS]
MAKE "VERBS READLIST
```

It's still around if you know where to look.





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```
END

TO VERB
RANPICK :VERBS
END

TO ADVERBLIST
PRINT [NAME FIVE ADVERBS]
MAKE "ADVERBS READLIST
END

TO ADVERB
RANPICK :ADVERBS
END

TO RANPICK :LIST
PRINT ITEM (1 + RANDOM COUNT :LIST) :LIST
END

TO SILLY
ADJECTIVE NOUN VERB ADVERB
END
```

Depending on your inputs, you can come up with all kinds of crazy sentences. Some of ours included DIRTY BOYS SLEEP LOUDLY and FRIENDLY GIRAFFES SING FAST. So, enjoy! And remember CREATIVE TURTLES PROGRAM WILDLY!

```
PPROP "AIDS "BURY "TRUE
PPROP ".SYSTEM "BURY "TRUE
TO STORY
CLEARTEXT
PRINT [NAME A HOLIDAY]
MAKE "HOLIDAY READLIST
PRINT [NAME A BUILDING]
MAKE "BUILDING READLIST
PRINT [NAME AN ANIMAL]
MAKE "ANIMAL READLIST
PRINT [NAME AN ARTICLE OF CLOTHING (PLURAL)]
MAKE "CLOTHING READLIST
PRINT [NAME A FAMOUS PERSON]
MAKE "PERSON READLIST
PRINT [NAME A PIECE OF FURNITURE (PLURAL)]
MAKE "FURNITURE READLIST
PRINT [NAME SOMETHING SWEET]
MAKE "SWEET READLIST
CLEARTEXT
PRINT [WAIT A MINUTE WHILE I PREPARE]
PRINT [YOUR ORIGINAL COMPOSITION...]
WAIT 100
CLEARTEXT
PRINT SE ['TWAS THE NIGHT BEFORE] :HOLIDAY
PRINT SE [WHEN ALL THROUGH THE] :BUILDING
PRINT [NOT A CREATURE WAS STIRRING]
PRINT SE [NOT EVEN A] :ANIMAL
PRINT SE [THE] :CLOTHING
PRINT [WERE HUNG BY THE CHIMNEY WITH CARE]
PRINT SE [IN HOPES THAT] :PERSON
PRINT [SOON WOULD BE THERE]
PRINT [THE CHILDREN WERE NESTLED]
PRINT SE [ALL SNUG IN THEIR] :FURNITURE
PRINT SE [WHILE VISIONS OF] :SWEET
PRINT [DANCED IN THEIR HEADS]
END

TO POEM
CLEARTEXT
PRINT [NAME A GIRL]
MAKE "GIRL READLIST
PRINT [NAME A PIECE OF FURNITURE]
MAKE "FURNITURE READLIST
PRINT [WHAT IS YOUR FAVORITE FOOD?]
```

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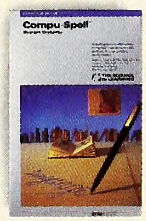

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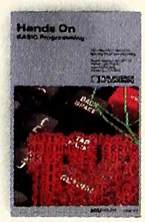

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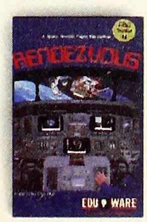

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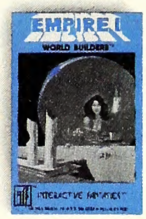

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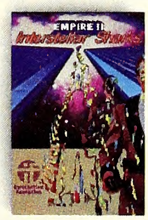

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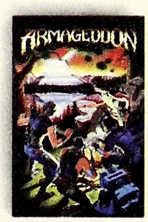

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```
MAKE "FOOD READLIST
PRINT [NAME AN INSECT OR BUG]
MAKE "BUG READLIST
WAIT 30 CLEARTEXT
PRINT [HERE'S YOUR ORIGINAL POEM!]
PRINT []
PRINT []
WAIT 50
PRINT SE [LITTLE MISS] :GIRL
PRINT SE [SAT ON A] :FURNITURE
PRINT SE [EATING] :FOOD
PRINT SE [ALONG CAME A] :BUG
PRINT [AND SAT DOWN BESIDE HER]
PRINT (SE [AND FRIGHTENED MISS] :GIRL [AWAY!])
END

TO POEM2
CLEARTEXT
PRINT [NAME A BOY]
MAKE "BOY READLIST
PRINT [NAME A MUSICAL INSTRUMENT]
MAKE "INSTRUMENT READLIST
PRINT [NAME AN ANIMAL]
MAKE "ANIMAL READLIST
PRINT [NAME A PLACE OUTDOORS]
MAKE "OUTDOORS READLIST
PRINT [NAME ANOTHER ANIMAL]
MAKE ANIMAL2 READLIST
PRINT [NAME ANOTHER PLACE OUTDOORS]
MAKE "OUTDOORS2 READLIST
PRINT [WHERE DO YOU LIKE TO HIDE?]
MAKE "HIDE READLIST
WAIT 30
CLEARTEXT
PRINT [HERE'S YOUR ORIGINAL POEM!]
WAIT 50
PRINT []
PRINT []
PRINT SE [LITTLE BOY] :BOY
PRINT SE [COME BLOW YOUR] :INSTRUMENT
PRINT (SE [THE] :ANIMAL [])
PRINT SE [IN THE] :OUTDOORS
PRINT (SE [THE] :ANIMAL2 ['S])
PRINT SE [IN THE] :OUTDOORS2
PRINT [WHERE IS THE BOY]
PRINT SE [WHO LOOKS AFTER THE] :ANIMAL
PRINT SE [HE'S] :HIDE
PRINT [FAST ASLEEP]
END

TO SILLY
ADJECTIVE NOUN VERB ADVERB
END

TO RANPICK :LIST
PRINT ITEM (1 + RANDOM COUNT :LIST) :LIST
END

TO ADVERB
RANPICK :ADVERBS
END

TO ADVERBLIST
PRINT [NAME FIVE ADVERBS]
MAKE "ADVERBS READLIST
END
```

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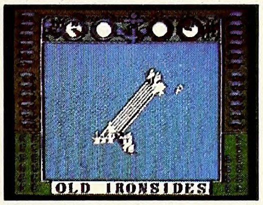

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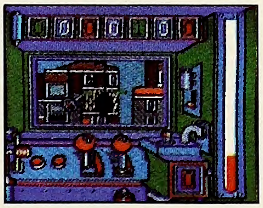

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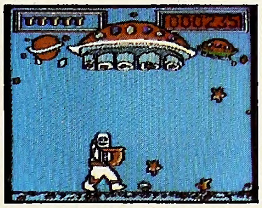

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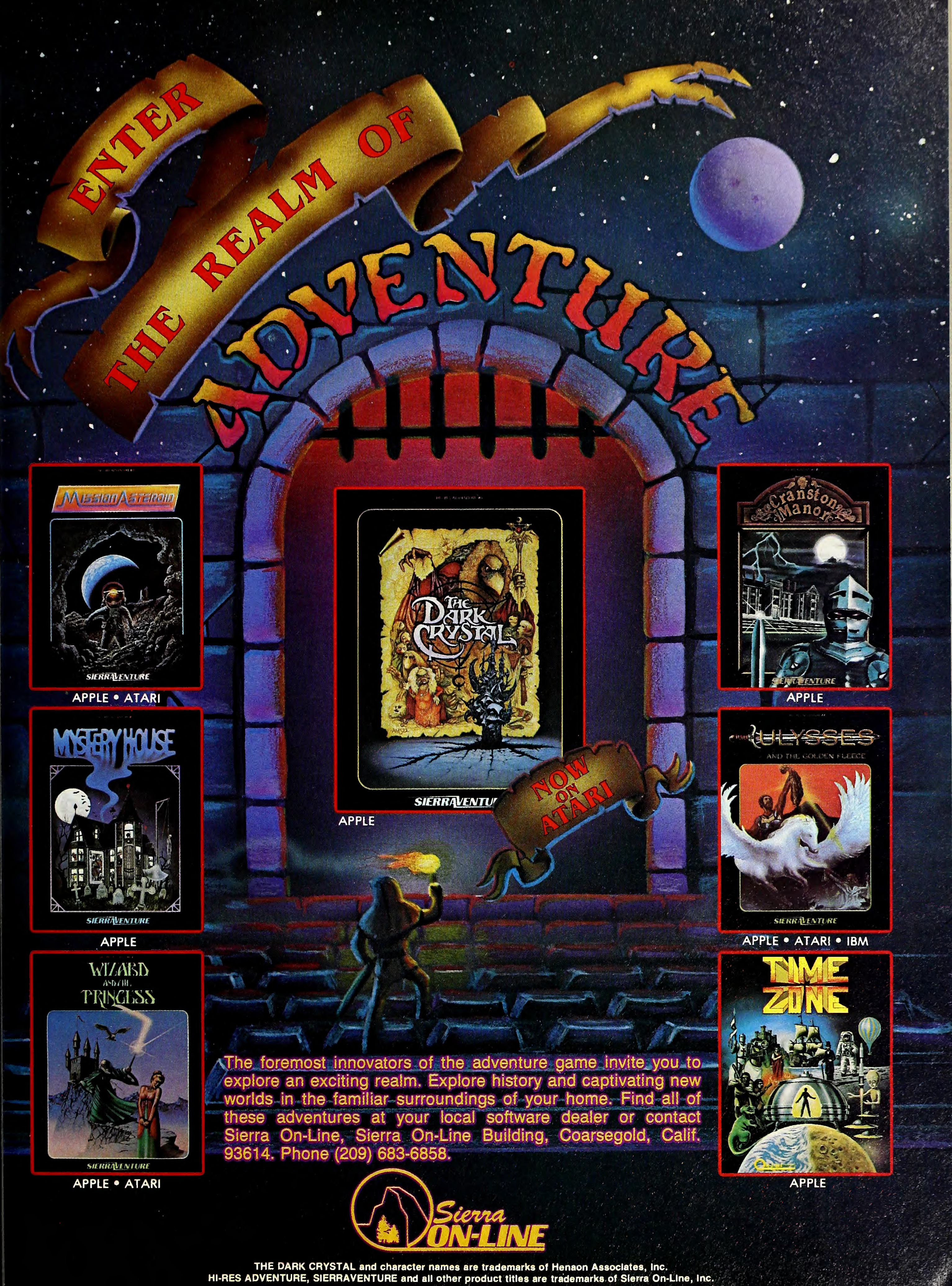
```
TO VERB
RANPICK :VERBS
END

TO VERBLIST
PRINT [NAME FIVE VERBS]
MAKE "VERBS READLIST
END

TO NOUN
RANPICK :NOUNS
END

TO NOUNLIST
PRINT [NAME FIVE PLURAL NOUNS]
MAKE "NOUNS READLIST
END

TO ADJECTIVE
RANPICK :ADJECTIVES
END

TO ADJECTIVELIST
PRINT [NAME FIVE ADJECTIVES]
MAKE "ADJECTIVES READLIST
END

TO COMPOSE
ADJECTIVELIST
NOUNLIST
VERBLIST
ADVERBLIST
WAIT 30
CLEARTEXT
SILLY
PR []
SILLY
PR []
SILLY
PR []
PR [TYPE "SILLY"]
PR [IF YOU WANT TO SEE ANOTHER ONE]
END

MAKE "NUMBER 0
MAKE "SWEET [CHOCOLATE CHIP COOKIES]
MAKE "PERSON [JOHN DENVER]
MAKE "CLOTHING [SHOES]
MAKE "BUILDING [FIRE STATION]
MAKE "HOLIDAY [HALLOWEEN]
MAKE "NOUNS [BOYS GIRLS DOGS CATS SHEEP]
MAKE "VERBS [SWIM DANCE BARK SLEEP GRAZE]
MAKE "BUG [SPIDER]
MAKE "FOOD [YOGURT]
MAKE "FURNITURE [DESKS]
MAKE "GIRL [STACY]
MAKE "HIDE [BEHIND THE CURTAINS]
MAKE "OUTDOORS2 [PLAYGROUND]
MAKE "ANIMAL2 [SKUNK]
MAKE "OUTDOORS [SOCCER FIELD]
MAKE "ANIMAL [CROCODILE]
MAKE "INSTRUMENT [VIOLIN]
MAKE "BOY [JEFF]
MAKE "ADJECTIVES [GREEN TALL SHORT SOFT HARD]
MAKE "ADVERBS [SWIFTLY GRACEFULLY LOUDLY GENTLY
  LIMPLY]
```



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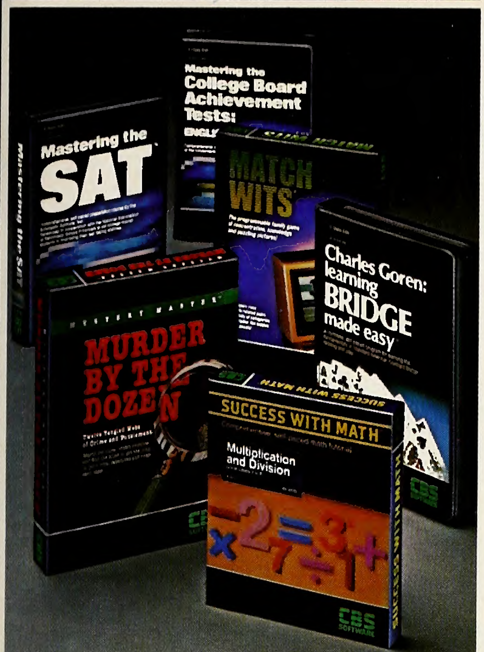

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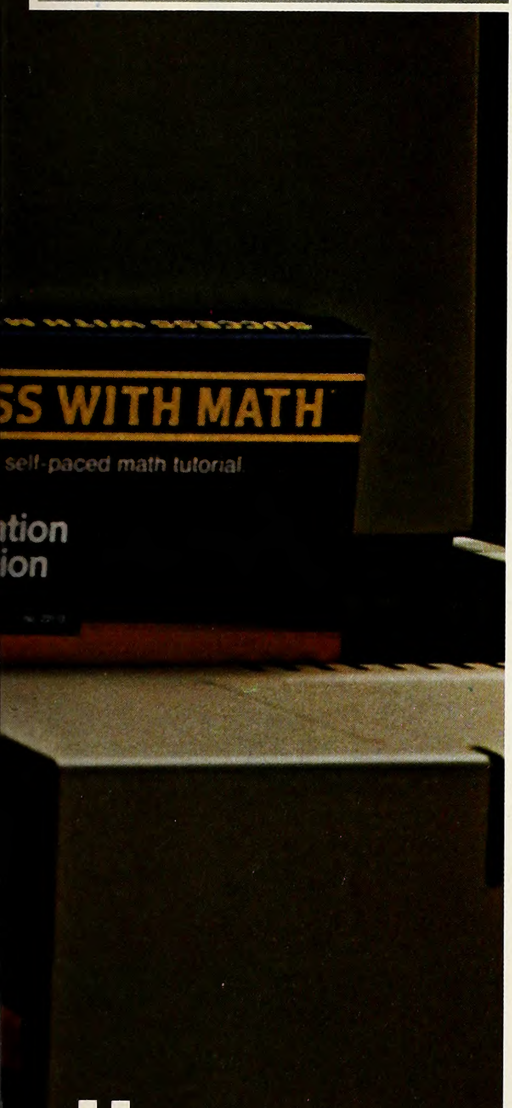

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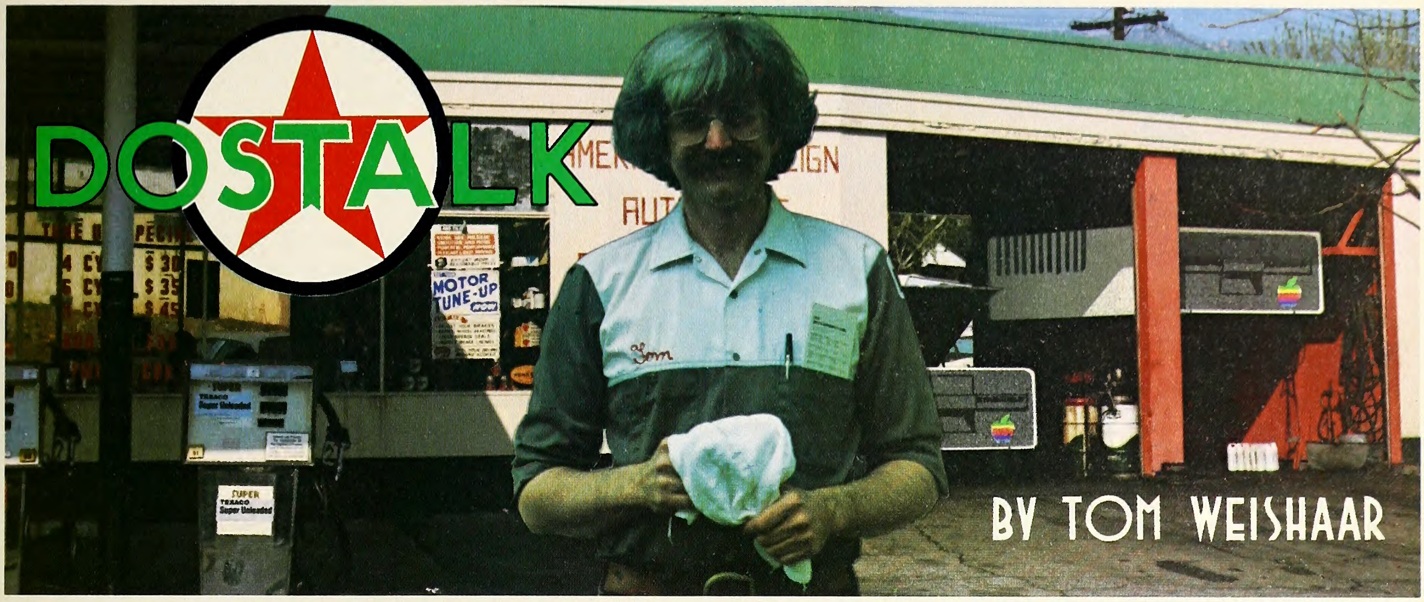


The mystery man of the DOS trinity is the file manager. Few users of Apple DOS have ever met this faceless bureaucrat. This month and next you'll learn who he is, what he can do, and how to fill out his forms so he'll work for you.

The only source of documentation on the file manager that we are aware of is the book *Beneath Apple DOS*, by Don Worth and Pieter Lechner. This month and next, DOStalk will expand upon and verify ideas that were first documented in this book.

Rub-a-Dub-Dub. The file manager is one of the three programs that make up Apple DOS, as regular readers of this column are well aware. The other two are the DOS command interpreter, which we call the Captain, and RWTS.

The Captain intercepts your commands, figures out what you want to do, and passes your instructions to the file manager.

The file manager is essentially a clerk. He stores files on your disks and retrieves them for you. He keeps track of where he puts things by writing notes to himself in special places on your disks. He cannot actually read from or write to your disks; only RWTS can do that. But the file manager tells RWTS what to do and when to do it.

For example, the file manager tells RWTS things like, "Load the contents of track 4, sector 8—of the disk currently in slot 6, drive 2—at byte 8192." The file manager makes his wishes known to RWTS by filling in a table known as the Input/Output Control Block, or IOB.

In a similar manner, the Captain gives orders to the file manager by filling in a table known as the File Manager Parameter List. He does this quite well, and many of you may be wondering why anyone would want to take this job away from him.

In fact, there is precious little practical value to be derived from using the file manager directly. But, as regular readers know, a great deal of the material presented in this column has little practical value.

A direct link to the file manager can provide a few capabilities that are otherwise unavailable. For example, you can get the file manager to load a text file directly into memory—as if it were a binary file. Conversely, you can read or write binary and Basic files a single byte at a time, just as text files are normally handled.

In addition, as we saw last month, DOS is a little more difficult to use from assembly language than it is from Basic. In some situations, assembly language programmers may find it easier to deal with the file manager directly than to work with the Captain. For example, there is no need to determine the location of DOS in memory when working with the file manager directly, while, as we saw last month, this is quite important when dealing with the Captain.

Only a few of you who read this column will ever find a good reason to actually use the information presented here. Nonetheless, everyone will leave with a better understanding of how DOS works and what can be done with it.

Pigeon Bytes. The File Manager Parameter List, which is the table you fill out to tell the file manager what to do, is like a big box with interior partitions that create a number of smaller boxes, or pigeonholes.

Some of the pigeonholes in the parameter list are only large enough for one-byte numbers. Others can hold two-byte numbers. Let's look at how we can use Basic to read the numbers in this table or store our own numbers there.

In the following discussion, the variable ADR will always represent the address of the byte we want to read or write. The variable V will represent the value associated with that byte.

It is quite easy to deal with one-byte numbers. Basic's peek and poke commands were designed to do just this.

For example, V = peek(ADR) is the typical Basic command for finding out what value is stored at a specific address. Likewise, poke ADR,V is the typical method for storing a particular value at a certain address.

The smallest number that can be stored in a single byte is 0. The largest number that can be stored in a single byte is 255. If you try to poke a value outside this range into a byte, Basic will beep you with an illegal quantity error. Larger values require the use of a two-byte number.

The address of a two-byte number in memory is always considered to be the address of the first of the two bytes. There is no way to tell by looking at a byte whether it holds a one-byte number or half of a two-byte number. This is determined by the programmer when the program is written. In the case of the parameter list, we'll tell you which addresses hold one-byte numbers and which hold two-byte numbers.

Think for a moment of a two-digit decimal number. One digit represents 10s and the other digit represents units or 1s. With a two-byte number, on the other hand, one byte represents 256s and the other 1s.

Essentially, using two-byte numbers requires a programmer to convert values from Basic's decimal, or base 10, number system to the computer memory's base 256 system. An additional complexity is that, in machine language, two-byte numbers are stored backward, the opposite of what we're used to with decimal numbers.

Backward Is Easy. So far this may sound exceedingly complex, but it's really pretty easy. For example, to read a two-byte number, use the statement:

```
V = PEEK (ADR) + (256 * PEEK (ADR + 1))
```

This statement adds the "units" byte, the first one at a specific address, to 256 times the second byte. V ends up as a decimal number indicating the value at the specified address.

Writing a two-byte number is somewhat more difficult. The value we start with has to be separated into 256s and units. There are several ways to do this. This one's as good as any of them:

```
POKE ADR + 1, V / 256 : POKE ADR, V - (PEEK(ADR + 1)*256)
```

In this method, the 256s byte is stored first. Basic will automatically determine how many 256s are in a value and throw away any remainder

when a division occurs inside a poke, as it does here. The second part of the method stores the units byte. To figure out how many units were left, the statement takes the original value and subtracts from it 256 times whatever was stored in ADR+1 by the first poke.

Since the parameter list doesn't always reside in the same place, let's refer to the pigeonholes using a variable that holds the beginning address of the list and an offset that identifies specific pigeonholes. Assume the address of the parameter list has been stored in the variable PARM. Then the first byte of the parameter list would be PARM+0. The second byte would be PARM+1, and so on.

Vectors Revisited. In June this column discussed the page three vector table. Those of you who read that column might remember that one of the vectors in that table is used to call the file manager and another is used to find the parameter list.

To use these vectors correctly, it is necessary to peek and poke some special memory locations, called registers, that are in the Apple's microprocessor itself. Unfortunately, Basic's peek and poke commands can be used only with standard memory locations. To handle the registers we'll have to use some short assembly language routines.

In a moment we'll look at a short Basic program that will load these assembly language routines for you. First, though, let's look at the routines themselves. They are simple enough that you should be able to understand how they work even if you've never seen an assembly language program before.

```
FINDPARM  JSR  $3DC
          STA  $4F
          STY  $4E
          RTS
;
NEOFILE   LDX  #$01
          JSR  $3D6
          RTS
;
OLDFILE   LDX  #$00
          JSR  $3D6
          RTS
```

The routine called FINDPARM begins by jumping to the subroutine (JSR) at memory address $3DC (in decimal that's 988). This subroutine is in the page three vector table. It is the one used to find the address of the parameter list. The page three routine stores the address of the parameter list in two of the microprocessor's registers. The high byte is stored in the A register; the low byte is stored in the Y register.

Then the page three subroutine returns to FINDPARM. It immediately stores the contents of the A register (STA) at location $4F (79) and the contents of the Y register (STY) at location $4E (78). Then FINDPARM ends with RTS, return from subroutine.

Now that we have the address of the parameter list stored at bytes 78 and 79, it will be very easy to retrieve it using the two-byte peek described earlier.

Any Reservations So Far? The other two routines, NEOFILE and OLDFILE, are used to call the file manager. Whenever the file manager is called, the microprocessor's X register must be loaded (LDX) with either a zero or a one. A zero indicates that, if the requested file is not found on the disk, it should be created. A one indicates that, if the file isn't found, the file manager should simply say so and not create one.

After the X register is loaded with the proper value, we jump to the page three vector that leads to the file manager, wherever he might be in memory. This vector is at byte $3D6 (982).

You may be wondering why the first of these two routines is named NEOFILE instead of NEWFILE. As you will see in a moment, these words will be used in a Basic program, and Basic won't let us use the word *new* inside a variable.

Here's the Basic program that will load in these routines:

```
200  FINDPARM = 768
210  NEOFILE = FINDPARM + 8
220  OLDFILE = FINDPARM + 14
230  FOR ADR = FINDPARM TO FINDPARM + 19
240  READ V
250  POKE ADR,V
260  NEXT
270  CALL FINDPARM
280  PARM = PEEK(78) + PEEK(79)*256
300  DATA 32,220,3,133,79,132,78,96
310  DATA 162,1,32,214,3,96
320  DATA 162,0,32,214,3,96
```

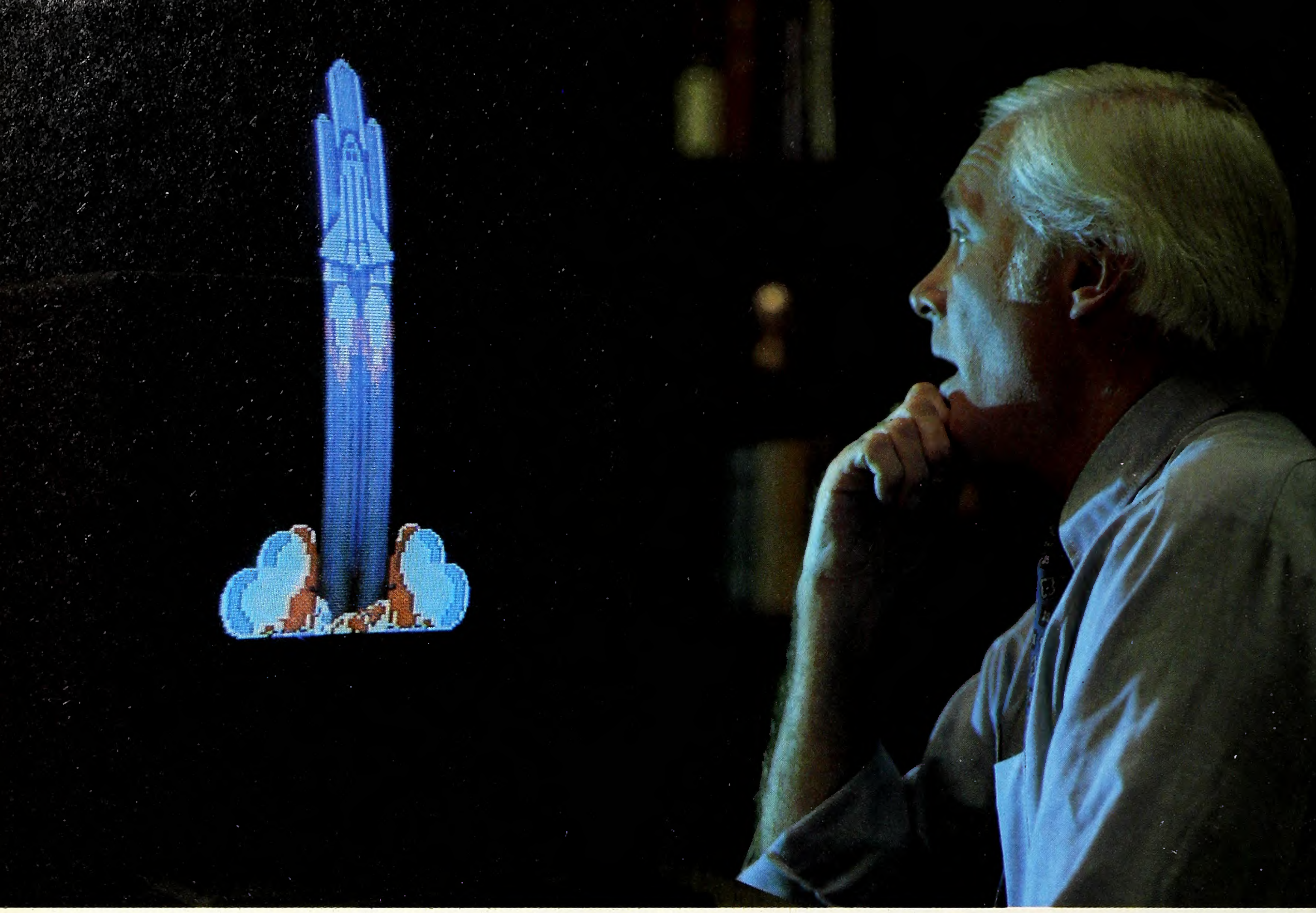
The routines are loaded at byte 768 ($300), but by changing the value in line 200 you can modify this. The routines are completely relocatable.

After this Basic routine has been run, three variables are set up for later use. PARM holds the address of the File Manager Parameter List; NEOFILE holds the address of the routine to be called to tell the file manager to create a new file; OLDFILE holds the address of the routine to be called to inform the file manager that no new file should be created.

The Parameter List. Now that we know how to find the parameter list and its pigeonholes, let's take a look at the list itself. The accompanying figure shows what the various pigeonholes are used for with housekeeping commands. The structure of the list is somewhat different with file access commands (read and write)—we'll take a look at those next month.

PARM		OPEN	CLOSE	DELETE	CATALOG	LOCK	UNLOCK	RENAME	INIT	VERIFY
+0	COMMAND	1	2	5	6	7	8	9	11	12
+1	DOS PAGE NUMBER	—	—	—	—	—	—	—	✓	—
+2	RECORD LENGTH (OPEN) ... ADDRESS OF NEW NAME (RENAME)	✓	—	—	—	—	—	✓	—	—
+4	VOLUME NUMBER	✓	—	✓	—	✓	✓	✓	✓	✓
+5	DRIVE NUMBER	✓	—	✓	✓	✓	✓	✓	✓	✓
+6	SLOT NUMBER	✓	—	✓	✓	✓	✓	✓	✓	✓
+7	FILE TYPE	✓	—	✓	—	✓	✓	✓	—	✓
+8	ADDRESS OF FILE NAME	✓	—	✓	—	✓	✓	✓	—	✓
+10	ERROR CODE	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UNUSED									
+12	ADDRESS OF WORK-AREA BUFFER	✓	✓	✓	✓	✓	✓	✓	✓	✓
+14	ADDRESS OF T/S LIST BUFFER	✓	✓	✓	—	✓	✓	✓	—	✓
+16	ADDRESS OF DATA BUFFER	—	✓	—	—	—	—	—	—	✓

File Manager Parameter List Housekeeping Commands



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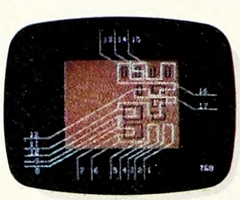

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The very first byte of the parameter list (PARM+0) holds the command. This can be a number ranging from 1 to 12. As shown in the figure, 1 indicates open, 2 close, 5 delete, and so on.

The second byte of the list (PARM+1) is used only with the init command. The next two bytes are used with open and rename only; we'll discuss all these later.

PARM+4 is used for the disk's volume number. This can be a number between 1 and 254, in which case the file manager will return a volume mismatch error if the volume number of the disk in the drive doesn't match the number given in the parameter list. You can also put a zero here. In that case the volume number of the disk will be ignored.

PARM+5 indicates the drive you want to use. PARM+6 indicates the slot.

PARM+7 is the file type pigeonhole. Actually, the file manager doesn't concern himself much with file types. As we will see next month, he never returns a file type mismatch error. The Captain does that.

If you are calling the file manager through OLDFILE (no new file will be created), the value you have in PARM+7 is ignored. However, you can look in PARM+7 after the call is finished to determine what the file type of the file was.

On the other hand, if you call the file manager through NEOFILE (if file not found, create it) and a new file is created, it will be given the file type you have specified in PARM+7.

Interestingly, several of the commands will actually create new files if you call them through NEOFILE. Open will do it, of course, but so will lock, unlock, rename, and verify. This makes no sense, but it shows you how important it is to call the file manager through OLDFILE rather than NEOFILE, unless you really do want a new file on your hands.

The File Name. PARM+8 is a two-byte value. Two-byte values are often memory addresses. The maximum value that can be stored in a two-byte value is 65,535, which, by design, is also the highest possible memory address in an Apple II computer.

The name of the file you want to use must be stored at the address you poke into PARM+8. If you are working in Basic, you need to poke the file name somewhere into memory and file a pointer to it in PARM+8. In addition, you need to pad the file name with blanks so it will be thirty characters long.

Assuming you have the file name you want to use stored in the variable F$, the first section of the following program segment will pad it with blanks, the second will poke it at whatever memory location NAME points to, and the third will put NAME in the parameter list.

```
700  FOR I = LEN(F$) + 1 TO 30
710  F$ = F$ + " " : REM (BLANK SPACE BETWEEN QUOTES)
720  NEXT
730  :
740  FOR I = 1 TO 30
750  POKE (NAME - 1) + I, 128 + ASC(MID$(F$,I,1))
760  NEXT
770  :
780  POKE PARM + 9, NAME / 256
790  POKE PARM + 8, NAME - PEEK(PARM + 9)*256
```

A suitable value for NAME would be 788 ($314). This would store the file name in some unused memory bytes right after our assembly language routines.

PARM+10 is the pigeonhole the file manager uses to pass back any error code. A zero at this location when the file manager is finished indicates that no error occurred. Otherwise the standard DOS error number will be stored here. We'll examine the file manager errors further next month.

Buffeted by Buffers. In the July DOStalk, we discussed the DOS buffers that the Captain reserves for the file manager's use. Every open file is allocated a DOS buffer. Each DOS buffer contains a 45-byte space known as the work-area buffer, a 256-byte space known as the track/sector list buffer, and a 256-byte space known as the data buffer.

The parameter list contains pigeonholes for storing the addresses of these buffers. When the file manager is called, he looks in the parameter list to find out where these buffers are.

The value stored at PARM+12 is the address of the work-area buff-

er. PARM+14 points to the track/sector list buffer. PARM+16 points to the data buffer.

When you use DOS in the normal manner, the Captain will find an empty DOS buffer and fill in these pigeonholes with the correct addresses for that buffer. When you call on the file manager directly, you have to do it yourself. The buffers you provide can be anywhere in memory—you don't have to use the normal DOS buffers. Often it is easier to set aside room in your own program space for these buffers. If you would prefer to use the standard DOS buffers, July's article explains how you can determine which ones are in use and which ones are vacant.

On the other hand, if you would prefer to use your own buffers and if you are programming in Basic, an easy way to set aside memory for the buffers is to use the himem command. For example:

```
100  HIMEM: 25000
110  WRKBUF=25000
120  TSBUF =WRKBUF+45
130  DTABUF=TSBUF +256
```

This sets aside the memory area from byte 25000 ($61A8) to the DOS buffers (usually byte 38400—$9600) for use by your program. Using the two-byte poke method demonstrated earlier, you would enter WRKBUF, TSBUF, and DTABUF into the parameter list at locations PARM+12, PARM+14, and PARM+16.

Calling the File Manager. The parameter list figure indicates which pigeonholes are actually used with each command. For example, to order the file manager to do a catalog, you would put the number for the catalog command, 6, in PARM+0 and enter the slot, drive, and address of the work-area buffer in the appropriate places. Then call OLDFILE and a catalog will appear on your screen. (In this case you could also call NEOFILE; catalog won't create a new file.)

When control returns to your program, you should take a peek at PARM+10, the error code. If this value is zero, the catalog executed successfully. If it is nonzero, an error occurred.

Operation of delete, lock, and unlock is very similar. You must also provide a volume number, the address of the file name, and the address of the track/sector list buffer. If you call the file manager through NEOFILE, and if the file you've requested doesn't exist, a new one will be created. It will be assigned the file type specified in PARM+7. If you call the file manager through OLDFILE, you can look at PARM+7 after the call to find out the type of the file.

There is nothing about either the lock or unlock command that requires it to use a file's track/sector list. Nonetheless, the file manager will load it into the track/sector list buffer when these commands are executed. The reason for this is that there is a single subroutine within the file manager that is always used with any housekeeping command that handles a single file (except close).

Thus open, delete, lock, unlock, rename, and verify all use this routine. This same routine is responsible for creating new files when the specified file isn't found, which accounts for the strange ability of some of the commands to create new files when accessed through NEOFILE.

Special Stuff. The rename command also requires a pointer to the new file name. As can be seen in the figure, the address of the new file name should be in PARM+2.

PARM+2 is used by the open command to indicate record length. If you are opening a random access file, PARM+2 should hold a two-byte number indicating the length of the records in that file. With any other file type, PARM+2 should hold a one and PARM+3 a zero. This will make the record length on these files equal to one. (*Beneath Apple DOS* indicates that a zero should be stored here. This will work too, but the file manager will change it to a one.)

PARM+1 is used during the init command. The file manager has to be told where DOS is so he can correctly copy it onto the newly initialized disk. With DOS at its normal 48K location, 157 is the correct value for this pigeonhole.

Play around with the information presented here. One warning, however: Make sure the disk you have in your drive as you test your program is expendable. One mistake and you could damage it.

Next month we'll continue this investigation by looking at the file manager's file access commands, read and write.

Who Will Win at VIDEOTEX

BY ROE R. ADAMS III

The door to the future opened a crack recently in New York City, and beautiful pictures streamed out of it. From June 27 through 29, Videotex '83 took place at the New York Hilton. This was the third international videotex conference organized by an English company, London On-line.

A fledgling field that is a combination of cable, video, and computers, videotex is undergoing severe growing pains. Videotex is not a home-grown cottage industry, as were the early cable and satellite industries. The cost of playing in this game is in the high millions. A quick tour of the sixty companies exhibiting at the conference yielded such heavy hitters as IBM, Sony, Digital Equipment Corporation, General Electric, Panasonic, NBC, North American Phillips, Time, and American Bell.

With returns on their investments almost nonexistent so far, some players are getting skittish. What's needed most is industry stabilization. Instead, as of this summer's conference, there were two standards of videotex, each drawing adherents and threatening to tear apart the industry in a struggle reminiscent of the early VHS versus Beta wars that happened in the video industry not so long ago.

New News. What is videotex and why all the fuss? A quick recap of videotex's brief history should provide some answers.

Like the Source or CompuServe, videotex is an informational database. But while those two U.S. systems transmit only text, videotex transmits pictures as well. Information is sent over cable or telephone lines and can be received only by special decoding terminals. Advertising is an integral part of most systems, and is shown either in between sections of information or run bannerlike across the bottom of the screen.

Videotex was first signed for commercial use by the English and the French a few years ago. The British system is called Prestel and is widely used abroad, while the French Telematique is hardly seen outside of France. Depending on the system, many forms of information are available on-line, including current news, weather, sports news, airline schedules, and large reference encyclopedias.

If you travel and frequently stay in hotels and motels, you may have seen the early U.S. attempts at transmitted information. Through cable channels to the rooms, a form of electronic publishing called Newsvideo is broadcast to guests. Newsvideo is transmitted only in alphanumeric (nongraphic) text similar to modem transmissions via an Apple or IBM Personal Computer. Yet, according to a report released at the Videotex '83 conference by Pacific Satellite Corporation of San Francisco, eighty-eight U.S. newspapers produced Newsvideo information services this year, reaching people at nearly 1.4 million locations as of May 1, 1983.

Videotex is quite different from Newsvideo. While much of the basic information is the same, videotex incorporates stunning visuals.

Britain's Prestel system achieves this by means of alphamosaic transmission. The term alphamosaic refers to the fact that information is sent in small blocks. Each block is two pixels (dots) wide by three pixels high; sixty-four different block combinations are possible. A picture is transmitted block by block to the receiving terminal. There, a special decoder reassembles the information into a picture on-screen. The screen picture, while hi-res, isn't perfect, and the shapes it produces are somewhat difficult to distinguish.

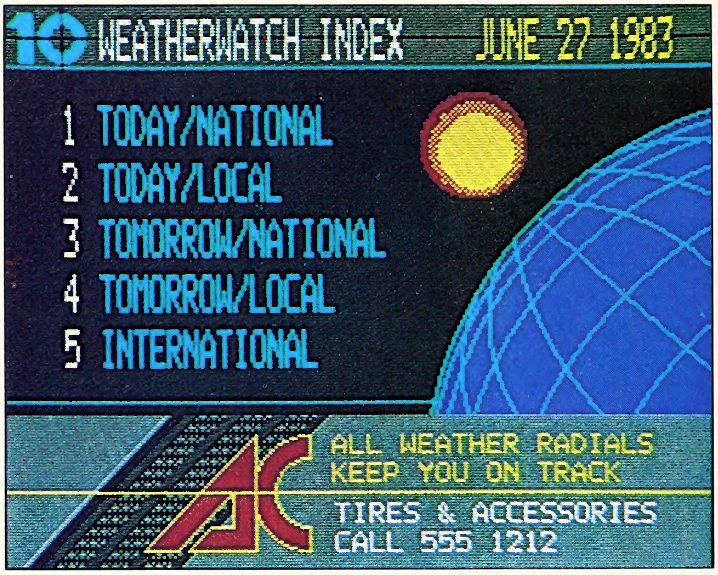
The Prestel system sends these blocks according to a fixed pattern. Prestel sends through only the changes in a block, rather than each block in its entirety. So, if a large area of a picture is all one color or shape, no data is sent for that section; instead, the current block is repeated in the pattern until a change is called for. Thus the alphamosaic system is very fast and cuts down on operating costs.

The Art of Info. Not long after the introduction of the Prestel system, the Canadians improved upon it, creating an alternate service called Telidon. Telidon transmits pictures over cable by means of a revolutionary technology known as alphageometric. This system sends a

picture pixel by pixel. These pixels, like those in Prestel, are decoded at a receiving terminal. The system also incorporates special coding transmissions that tell the system to draw certain shapes. Not only can Telidon draw dots, it can draw six shapes, including lines, arcs, and polygons. The pictures it produces are breathtaking.

Very high degrees of resolution are possible with the alphageometric approach, but it is slow and hence much more expensive to operate than alphamosaic. Telidon has a special feature—the ability to shift into something called alphaphotographic mode (still got all these alphas straight?). This makes it possible to do very slow bit mapping, which means that photographs can be transmitted over cable or telephone lines. Alphaphotographic mode is similar to the Quix photo-transmittal service currently being used in many businesses.

As of early last year, Prestel was doing a very good job of lining up franchisees for its service in the American markets. Then a bombshell hit. High-tech megagiant American Bell took a fancy to the Canadian system. Some judicious tinkering at Bell Labs resulted in the development of a souped-up version of Telidon's system. This one offers twelve drawing functions instead of six and a picture quality that is outstanding.



Teletext transmits concise information quickly, using text supported by graphics.

In true fashion, American Bell called the system NAPLPS, short for North American Presentation Level Protocol Syntax.

Because of its many connections and devotees, Prestel managed to hold its own against the newcomer through the winter. A big boost in morale for Prestel came this past spring, when Teletext was launched.

Teletext uses the alphamosaic system for broadcasting. This was good news to the Europeans because it created an instant and enormous market for European decoder boxes. Such was the shape of things going into the June conference.

Teletext is a joint venture of two television networks, NBC and CBS. Instead of transmitting pictures by cable or telephone lines, the networks dreamed up the idea of using television broadcasts. They developed their own standard (of course), the North American Broadcast Teletext Specification (NABTS).

A Big Broadcast. Teletext is not videotex exactly, but it resembles it. Videotex is a two-way system in which the user interacts with most of the services, such as electronic mail, catalog ordering, and ticket reservations. With Teletext, the interface is minimal, mostly confined to selecting what you want to look at. Selections are made via a decoder box in the home. The analogy of a remote control TV channel turner is apt.

Teletext transmits information on the upper edge of your regular television screen, along with the normal network feed. Look very closely at a normal television picture and you'll spot a tiny band of black at the top of the screen. We're so used to seeing this as a normal part of the picture that we hardly realize it's there. Within that black area are twenty-one lines of unused transmission space known as the vertical blanking interval (VBI). Captioned broadcasts for the hearing-impaired use line 21 now. Teletext will use lines 15 through 19; transmissions will be completely invisible unless you have a decoder box. (Maybe someday they will even bring back decoder rings. Ah, Captain Video, you were only a few years ahead of your time!)

Speaking at Videotex '83 before a packed house, Barbara Watson, general manager of NBC Teletext, described the success of NBC's trial broadcast. This historic event occurred in April 1983 at the National Association of Broadcasters convention in Las Vegas. Watson expressed the belief that Teletext will do better than videotex because it is a mass medium that will reach far more homes than videotex and because the network has vast production facilities to produce high-quality programming. She also noted that "the fundamental problem with videotex lies in the two-way connection to the home. Access to the phone line is not cheap, and the user of a videotex system will have to pay for the connection time—even the time he is sitting in front of the terminal figuring out what to do."

Clash of Titans. The alphamosaic crowd went into Videotex '83 feeling terrific, but the roof caved in the very first day. First, IBM announced at the show that it was going to adopt someone else's standard (IBM usually insists on an IBM standard for everything). Henceforth, the official IBM videotex standard would be American Bell's NAPLPS. Off the record, IBM personnel said that while they would continue to support interface equipment for the Prestel system, the main thrust of the company was going to be in support of the development of the NAPLPS.

While the Prestel group was reeling from this blow, *International Videotex Teletext News* announced that NAPLPS was on the verge of being accepted as the official videotex standard for both the United States and Canada. The rout was almost complete. The eight thousand Videotex '83 attendees spent most of their time jammed around the booths of companies that supported the alphageometric system.

Riding the crest of all that enthusiasm, two other companies announced the debut of competing NAPLPS-standard videotex systems, both scheduled to be on-line within a year. Beginning in the second quarter of 1984, the Times Mirror Company will be sponsoring the Gateway videotex service under the company name Videotex America. Initially, Videotex America will serve the greater Los Angeles area. Gateway's startup database will offer fifty thousand pages of information and services.

At Videotex '83, the company announced the results of its initial field test, which took place last year in Rancho Palos Verdes and Mission Viejo, California. Some three hundred fifty households in these two small southern California communities participated. Rated as "essential" were games (79 percent), shopping/product information (72 percent), bill paying at a bank (71 percent), late-breaking news (60 percent), education for children (57 percent), and electronic mail (56 percent). Input from the Associated Press, the *Los Angeles Times*, and community newspapers made more than three thousand pages of news available daily.

Times Mirror's big competitor in this game is another newspaper supergiant, Knight-Ridder Newspapers. The Knight-Ridder service (which has received much assistance from American Bell) is called Viewtron. Scheduled to be operational by year's end, Viewtron is slated to offer its customers a cornucopia of services and information. According to Knight-Ridder, more than one hundred and fifty advertisers have signed up to participate. In addition, fifty Informational Providers (IPs) are on-board to provide information on a wide range of topics.

Seven Guides for Seven Druthers. Besides providing all the usual videotex services, Viewtron offers subscribers seven gateways. These are not to be confused with Times Mirror's Gateway. Each of Viewtron's gateways links a computer system at some other company into the Viewtron system. The result is basically a networking arrangement that allows Viewtron users to connect with computer systems in various parts of the country.

Viewtron's seven gateways link subscribers up with American Express, Commodity News Service, E.F. Hutton, Grolier Academic American Encyclopedia, J.C. Penney (the *whole* catalog), the Official Airline Guide, and VideoFinancial Services. The Grolier gateway gains the subscriber entree to a computer in Philadelphia that contains the entire nine-million-word, twenty-eight-thousand-article-entry encyclopedia—the only one of its kind in the country. The J.C. Penney gateway allows subscribers to order (and immediately confirm the availability of) any item from the catalog.

Writing in a recent issue of the *Washington Journalism Review*, John Morton observed, "The market niche Viewtron is likely to capture may be small but it is the heart of the high-income, well-educated sector that

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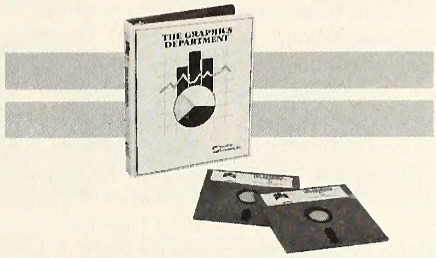

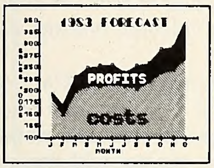

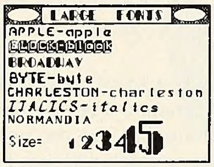

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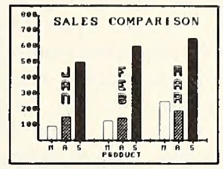

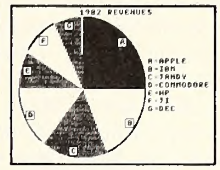

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The fact that so many newspapers are jumping on the Viewtron bandwagon certainly supports Morton's view. Boston is slated to be the next Viewtron market, under the auspices of the *Boston Globe*. Among the other newspapers (and their cities) scheduled for inclusion within a few years are the *Detroit Free Press*, the *Baltimore Sun-Times*, the *Philadelphia Inquirer*, the *San Jose Mercury*, the *Rocky Mountain News*, the *Seattle Times*, the *Star-Telegram* (Fort Worth, TX), and the *Star-Ledger* (Newark, NJ). The typical setup will be for the participating newspaper to receive 75 percent of the revenue, while Viewtron gets the rest.

Texual Ceiling. Viewtron plans to offer a controversial new service—electronic banking. The main issues this raises have to do with privacy and security. John Wooley, chairman of the Videotex Industry Association's (VIA) fair practice committee, addressed these concerns at the conference. "Many people want to know whether this new technology will invade their privacy," said Wooley. "They can be reassured by the fact that, to date, there have been no reported privacy abuses in the videotex industry."

In an effort to preserve that fine record, Viewtron will use the National Bureau of Standards's Data Encryption Standard (DES). Viewtron's Bill Ritter, who also spoke at the conference, stated that this encryption system is so good that it would take a state-of-the-art computer ten years to explore all the permutations required to break the code.

So far, Knight-Ridder has invested $26 million in Viewtron. The basic fees charged to subscribers are a modest twelve dollars per month (decoder box included) plus an estimated average connect cost via phone lines of fourteen dollars per month. This last estimate is probably much too low, however, as it is based on a daily usage of half an hour. None of that seems terribly expensive, but there's a kicker—a special terminal, priced at around six hundred dollars, is needed. The price of this terminal is likely to stop many people cold. The problems of hardware and its cost were addressed at Videotex '83. A big stir came with American Bell's unveiling of its sleek new Spectre consumer videotex terminal. Designed expressly to be used with Viewtron, this 1200-baud terminal features a wireless keypad and built-in encryption/security features for banking. The price is still in the six-hundred-dollar range. Sony displayed the new Sony Trinitron KITX-8300 videotex terminal—a real eye-catcher. Sony's terminal includes a built-in modem, a slim keypad, and, as an added option, a small upright thermal printer that can print a videotex screen in only thirteen seconds.

A major thrust of the videotex industry today is to find ways to bring the cost of terminals down to under two hundred dollars. The most promising research centers on the large microcomputer base already in existence in the United States. Provided that cheap interfaces can be found for Apples, IBM pcs, and Commodores, the videotex systems should really take off.

In the July issue of his newsletter, *Teleservices Report*, Gary Arlen cites some pertinent information from a special American Bell research report. This report concluded that the potential videotex market is broken into two segments: "high affluent households, with income of more than $25,000 annually (and representing 30 percent of all U.S. households), and technological innovators and early adapters, which draw from all age levels." This last group certainly sounds like the average microcomputer owner.

An announcement made at this summer's conference proclaimed that, effective sometime this fall, alphamosaic interface boards will be sold for the Apple and Commodore. The IBM interface is to be announced shortly. Should Prestel manage to integrate microcomputer owners into the videotex evolution, the French group may still emerge a victor in the struggle to dominate an industry that promises to be highly lucrative. Then again, who knows? Perhaps an entirely new alpha something or other is waiting in the wings to supplant both systems.

The next five years of videotex will definitely not be boring. Tune in and watch the fun. The door is opening wider all the time.

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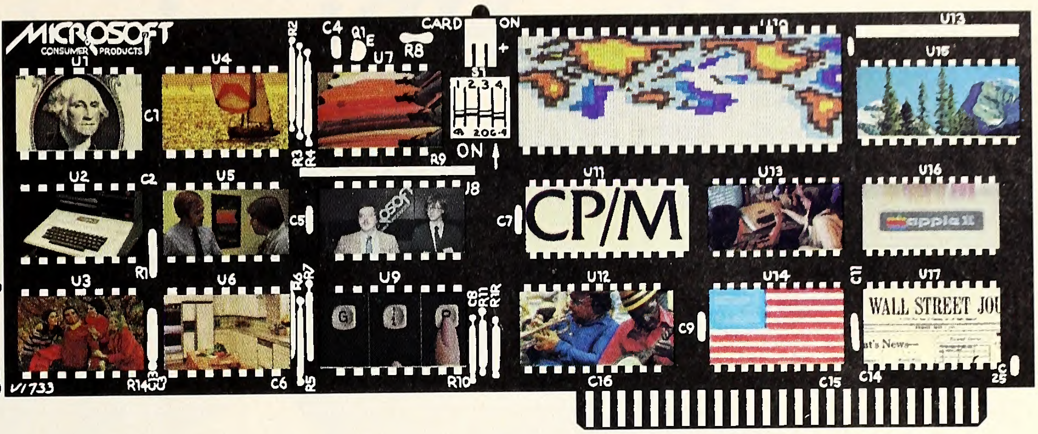

Welcome to the October installment of SoftCard Symposium and our continuing discussion of the BIOS disk I/O routines. This month we'll begin studying READ and WRITE, the most complex of the BIOS functions. It's ironic that while these two routines are separate and distinct, in fact they're usually only short preparation routines for a much larger section of code common to both of them; it is this larger section of code that actually performs the read or write.

Setting things up in this fashion has been a fairly constant practice since the early days of CP/M. The reason READ and WRITE are implemented this way has to do with the nature of the disk access hardware in most computers. Generally speaking, the same tasks are performed regardless of whether a read or write is in progress; the only difference is in the direction of data transfer—from memory to disk during a write and from disk to memory during a read.

Since in most computers the hardware of the disk controller performs the actual manipulation of data on the disk surface, the software need perform only three basic functions. First, it must prepare the controller for action; second, it must tell the controller in which direction the data will go; and third, it must send and receive data to and from the controller.

Controller preparation is usually the most complex of these three functions. Often the software must select a particular drive, perform a seek to a particular track, load the read/write head of the drive onto the disk surface, and do other things specific to the controller in use. Each of these preparation tasks often requires precise timing and close monitoring.

The second function (the one that tells the controller whether this is a read or write) usually involves just loading a single-byte command into a register on the controller. Likewise, the third function may be as simple as passing a single command byte to the computer's DMA hardware.

Since function number one must be performed the same way regardless of whether the action is a read or write, and since this function is the most complex of the three, it only makes sense to make this function common to both operations, thereby avoiding a lot of unnecessary duplication of code. In this way, the system is made more efficient in terms of both speed and memory usage. This explains why most BIOS implementations have a single routine that both reads and writes data that can be entered via either a read entry point or a write entry point. These two entry points, then, must in some way inform the routine as to which type of operation is to be performed. In a very simple BIOS (one that deals only with single-density IBM 3740 format, for example), this is all that needs to be done. More modern BIOS implementations, such as those dealing with sector sizes larger than 128 bytes or with more than one type of disk drive in the same system, must be made more complex.

Today, most BIOS implementations are of the latter variety. The popularity of double-density and double-sided disk drives, as well as that of fixed media hard drives, has made this inevitable. The most common factor that must be addressed is the larger sector sizes used by modern systems. Since CP/M was designed to handle only the 128-byte sectors used in the IBM 3740 format, virtually everything CP/M does is based on this unit of data. Therefore, using disk drives with 256-, 512-, or 1,024-byte sectors means that some method of translation must be implemented so that the BIOS can give BDOS what it needs when requested. The processes involved in this translation are known as *blocking* and *deblocking*.

In deblocking, the BIOS reads in a sector of information, say 512 bytes. Then, by dividing that sector into 128-byte logical subsectors, the BIOS can pass to BDOS the subsector BDOS has requested. This process has become known as deblocking because the block of data (the physical sector) is split into its component CP/M file records (the subsectors).

The blocking process is exactly the reverse of deblocking and takes place during write operations. Individual CP/M file records are placed in a memory buffer the size of a physical record. They are placed there in an order based on their logical sector numbers. When a complete block of these records has been assembled, the entire physical sector is written to disk.

Obviously, the BIOS for such a system must be much more complex than that for IBM single-density format. If BDOS read or wrote all subsectors in exact order and then fully requested or filled all physical sectors, the blocking process would not have to be so elaborate. But since BDOS thinks of the subsectors as actual physical sectors, it may often read or write only one subsector in a given physical sector before going to a different one or even to a different track or disk.

This tendency on the part of BDOS means that the BIOS designer must take all possibilities into account. Each time BDOS requests a write, the designer must assume the worst possible case; that is, the designer must assume that this is the only write BDOS will make to this specific physical sector. It's obvious that if the worst case just mentioned were true, the BIOS could not simply install the subsector into the buffer and write the sector. Doing that would in fact overwrite and destroy any other subsectors in this physical sector on the disk. To avoid having this happen, the BIOS must perform a preread; that is to say the BIOS must read the appropriate physical sector into the memory buffer before accepting the subsector from BDOS. When BIOS

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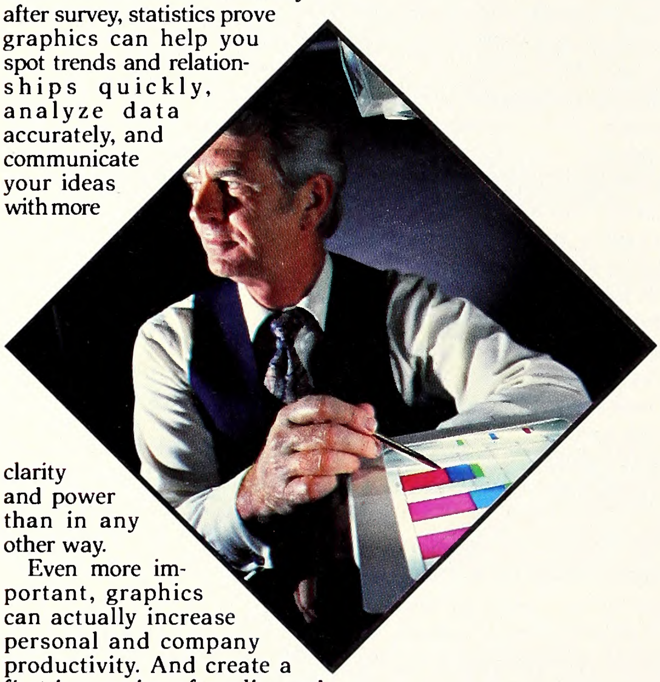

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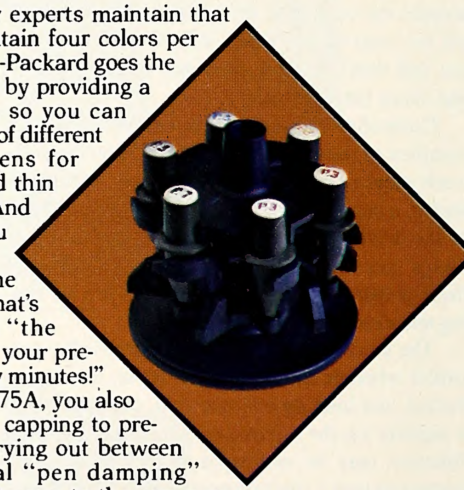

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has the correct contents of the physical disk sector in memory, it can then place the new subsector in its correct position in the buffer, leaving the remaining contents of the physical sector as they were. An actual disk write of the physical sector at this point, then, alters only the subsector that BDOS wished to have altered.

A BIOS like the one we've just described would ensure the integrity of the data on disk, but since both a read and write must be performed for each write, it would be abysmally slow. If a BIOS of this sort were the only option, single density would probably still be the primary storage format. Luckily, at the expense of making the BIOS slightly longer and more complex, this problem can be overcome. This is done by delaying most write operations until we are actually sure that BDOS is going to change physical sectors, tracks, or drives.

The BIOS, then, handles writes in the following way. On the very first write, BIOS checks to see if the subsector to be written corresponds to the physical sector, track, and drive that were last read or written to. If the subsectors are in fact the same, the BIOS knows that the physical sector buffer in memory inside itself contains the correct data from disk. BIOS then accepts the subsector from BDOS, places it in the buffer in its appropriate place, and sets a special flag. This flag indicates that there is now valid data in the buffer that BDOS thinks has already been written to disk. No disk access has been made at this point, so the flag is necessary to ensure that the physical sector buffer will eventually get written.

If, on the other hand, the subsector had not matched the last physical sector, track, and drive, BIOS would have known that the buffer did not contain the correct physical sector. Since this is our first write, we'll assume that the buffer contains no valid data at all (the flag is not set). Since the buffer contains no physical sector, the BIOS must read into the buffer the physical sector containing the subsector that BDOS is trying to write. From here on, the process is the same as if the physical sectors had matched: BIOS accepts the subsector, places it in the buffer, and sets the flag to show that valid unwritten data now resides in the buffer.

On subsequent writes, then, when BIOS checks the flag, the flag will show that the buffer is valid. If the current subsector to be written is in the same physical sector as the subsector in the buffer, BIOS will simply keep placing subsectors into the buffer, setting the flag, and returning to BDOS. If the physical sectors do not match, however, then BIOS must write out the physical sector buffer to disk before doing anything else. Then it must preread the new physical sector, and finally it must get the new subsector from the location supplied by BDOS (somewhere in user memory) and place it in the buffer, setting the buffer-active flag once more.

While complex to implement, the process just described usually results in a significant increase in disk access speed. The reason for this is simple: The time-consuming portion of disk access is the actual time spent by the software and hardware in manipulating the drive. Since blocking/deblocking allows two or more sectors to be read into memory for every access of the disk, most data transfer is between memory buffers—a much faster process. With single-density formats, in which no block/deblock takes place, all data transfer involves actual disk access, and the resulting degradation of performance is readily apparent. A constant increase in performance at the expense of a one-time increase in complexity seems a good trade. For that reason, yet another complex feature was installed—namely, different treatment of different types of write operations.

Most blocking/deblocking BIOS installations distinguish between different types of writes. To see why, take the preread that BIOS must perform as an example. This preread is really only necessary when the physical sector on the disk contains valid information. Obviously, when areas that are not currently allocated to files are being written to, the preread can be skipped. To increase performance, then, we should at least be able to differentiate between writes to allocated and unallocated areas of the disk. It must also be possible to separate out a write operation to the directory.

As we have seen, BDOS deals with only one directory file entry at a time, holding it in memory and modifying it as the file is being modified. Only when BDOS has finished modifying the file (or file portion) described in that entry does it write the entry back to the directory on disk. It then creates or reads a new entry before going off to write more information in the file. It should be obvious from this fact that there will seldom be a time when more than one subsector will be written to the same physical sector without a normal file write occurring in between. Since the only reason we postpone writes is to capitalize on situations in which more than one subsector is to be written in one place, it is apparent that directory writes do not need to be postponed.

We now know that we can increase performance by knowing whether a write is to be made to an unallocated area, to an allocated area, or to the directory. Luckily, BDOS is equipped to provide this information. Each time it calls the BIOS write routine, register [C] contains a 0 for a normal sector write, a 1 for a write to the directory, or a 2 for the first write to an unallocated area.

Obviously, the allocated and unallocated areas we've been talking about here are the allocation blocks that BDOS uses to divide up the disk, since BDOS has no idea what physical sector sizes are in use. In reality, each allocation block normally contains several physical sectors, and we could improve performance still further if we could avoid prereads on the write to any unallocated physical sector instead of just to the first sector in an unallocated block. This has been done in the SoftCard BIOS, as we shall see later.

The BIOS, then, must be made capable of differentiating between unallocated writes (2), which it can do without prereads; normal sector writes (0), which require a preread on the first subsector; and directory writes (1), which always require prereads and must be written immediately. In its

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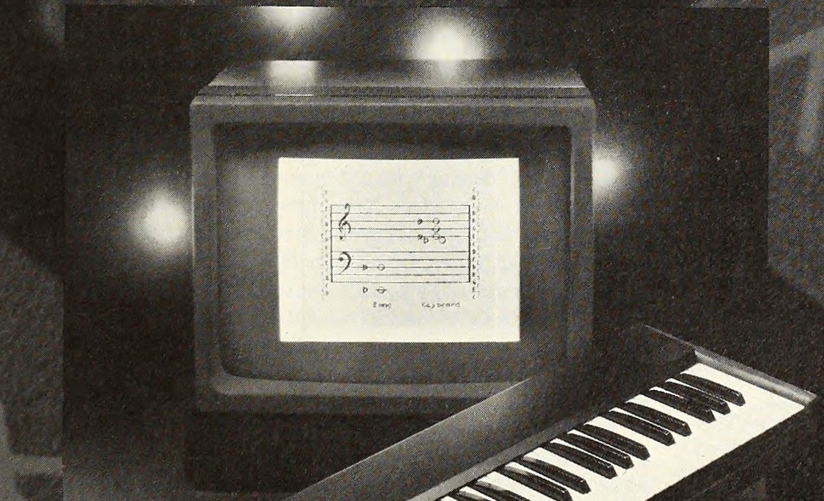

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alteration guide, Digital Research provides sample disk I/O routines that implement blocking and deblocking to go with its sample BIOS for the Intel MDS development system. While many people have had success using these routines, others have criticized them as flawed or inefficient. Without entering into the controversy, it is safe to say that most BIOS installations in operation today use the basic algorithm provided by Digital but modify it to allow optimum activity in a particular computer system.

In the SoftCard BIOS, blocking and deblocking are performed to translate the Apple's 256-byte physical sectors into 128-byte subsectors. A modified form of Digital's algorithm is used, and duplication of hardware (or RWTS) control routines has been avoided as much as possible. The read/write code has several components. First, there's the physical sector buffer (also called the host buffer), appropriately named HSTBUF. Located at 0F800H, HSTBUF is simply a 256-byte page of RAM used as the source for all write operations to the disk and as the destination of all disk read operations. Next are two routines designed to get a physical sector from the disk or to put one on the disk; these are known as READHST and WRITEHST respectively.

READHST reads a physical sector into the host buffer, while WRITEHST writes the host buffer to the disk. In actuality, the code that calls RWTS and checks for errors is used by both routines; these routines simply load the type of command (read or write) into register [A] for RWTS. READHST goes on to execute the common routine. WRITEHST, which is in memory ahead of READHST, sets up things for a write and then skips the portion of READHST that loads the read command.

So far, then, we have a host buffer for storing physical sectors and routines that read and write between that buffer and the disk. If BDOS were capable of dealing with 256 bytes at a time, we'd have all we needed. Now, however, we need routines that, by moving data between user memory and the buffer, simulate for BDOS disk reads and writes of 128-byte subsectors. As if that weren't enough, these routines must also manage the host buffer, writing it out and refilling it when necessary, while optimizing the entire operation for speed. This is no simple task.

The first thing to be done is to set up a method of keeping track of the disk location (the drive/track/sector) that corresponds to the contents of the host buffer. This ensures that we'll always know where the buffer goes when the time comes to write it out. What happens, though, when BDOS requests that a new drive be selected? Do we always write out the host buffer? If so, the method we've devised won't be very efficient, since BDOS may select a new drive without ever accessing it and may come back afterward to access the very same sector we had in the host buffer.

The way to avoid this problem is to keep two sets of disk location variables. The host set always shows the disk location of the contents of the host buffer. The names of these variables usually start with HST. The variables in the other set, called the seek variables, are used to store the drive, track, and sector being selected by BDOS. Their names usually start with SEK. Since resetting the seek variables does not alter the host set, we don't need to write out the host buffer whenever one of the seek variables is changed. It's not until BDOS actually requests a read or write that we even need to worry about the host buffer. This is one case in which waiting until the last minute makes things more efficient.

In essence, then, we let BDOS do all the changing of the seek variables that it wants to—calling SELDSK, HOME, SETSEC, and SETTRK. Then, when BDOS has finally set up everything to its satisfaction and calls READ or WRITE, we examine the seek variables and compare them to the host variables. If the host variables match the seek variables, we know that we already have the proper sector in the host buffer. If BDOS has requested a read, we take the appropriate part of the buffer and put it in memory where BDOS has told us to; if, on the other hand, BDOS has requested a write, we move the subsector from user memory to the appropriate part of the host buffer. Since no disk accesses had to be made, this operation is very fast. Had there been no match, things would have been slightly more complicated. We would have known, for example, that this situation might require that a new physical sector be read into the host buffer or possibly that a new subsector be moved from user memory into the buffer. In either case the result would be the trashing of the buffer's current contents. The first thing we need to do, then, is to see if the buffer contains valid unwritten data.

We do this by means of two flags, HBFACT and SECMOD. The former is a sign that the host buffer contains active data, which is to say that the data in the buffer is in fact an actual physical sector corresponding to the disk location identified by the host variables. The SECMOD flag is similar but indicates that the host buffer has been modified by data being moved into it from user memory. In other words, a subsector that BDOS thinks was written to disk has been moved into the host buffer but has not yet been actually written on the disk.

Let's see how these flags respond during operation. Three operating conditions merit examination: BDOS requesting a read, BDOS requesting a normal write, and BDOS requesting a write to an unallocated area (a directory write is always treated as a normal write for the purposes of the flags).

For a BDOS read, the host buffer will always be filled with what is actually on the disk. HBFACT, then, will be set nonzero to show that the host buffer contains valid data from the disk location shown in the host variables. SECMOD, however, will be nonzero, since no alteration of the host buffer has been made.

An unallocated write by BDOS means that no preread of the actual disk contents needs to be made. HBFACT is still set to nonzero, though, since the host buffer will be filled with a valid subsector of data and the host variables have been set up to identify the disk location to which the data belongs. SECMOD in this case is also set

nonzero, since the actual disk contents have not yet been updated to match the host buffer.

Finally, a normal write by BDOS means that a preread must be made to get the current disk contents into the host buffer before moving in the subsector. In this case, the buffer contains valid data and the host variables point to the correct disk location, so HBFACT will be nonzero. Since the subsector has been moved into the host buffer after the preread, the buffer no longer matches the disk contents; therefore, SECMOD will also be nonzero. By using these flags and comparing the host and seek variables, the BIOS can always determine the current state of the host buffer and from that can determine whether the host buffer must be filled, written to disk, or both prior to the next operation.

We'll call the HBFACT and SECMOD flags *status flags* or *state flags*; they're called this because they show the status of a specific object, in this case the host buffer. Several other flags are used in the BIOS read/write code. We'll call them *action flags*, since they are used to indicate to routines executed later on that some specific action is to be performed.

The three action flags in use in the SoftCard BIOS are called READOP, WRTYPE, and RSFLAG. As its name implies, READOP is set to nonzero to indicate that this is a read operation, or cleared to zero to indicate a write operation. WRTYPE is used to store the value that BDOS passes to the WRITE routine to indicate the type of write (0, 1, or 2) to be performed. Finally, RSFLAG is used to indicate that a preread is necessary when set nonzero, or that no preread is necessary when cleared to zero.

Using these five flags, it is possible to create one routine that can essentially control everything—performing straight reads, writes with prereads, or writes without prereads—all while keeping track of the host buffer and filling it and writing it out as necessary. This common routine is called RWOPER. It is from this routine that READHST and WRITEHST are called as necessary to fill or empty the host buffer. RWOPER also handles the movement of subsectors between user memory and the host buffer in response to BDOS read and write requests. RWOPER is entered from either the READ routine or the WRITE routine after one of these routines has initialized the three action flags to suit the specific process RWOPER is to perform. In turn, RWOPER is reponsible for setting the two status flags each time it changes the status of the host buffer.

There's one other significant piece of code contained within the WRITE routine. It is called CHKUNA, and it is responsible for handling the setting of the action flag RSFLAG. CHKUNA is the means to accomplish the goal we spoke of earlier—to allow all physical sectors in an unallocated data block to be written without prereads. It does this by keeping its own set of disk location variables, called the unallocated variables (this time all starting with UNA). When the first write to an unallocated data block occurs, CHKUNA recognizes this fact by the write-type value of 2 passed by BDOS in register [C]. At this point it loads a counter variable with 8, the number of subsectors in an allocation block. CHKUNA also sets all of the unallocated variables to equal the seek variables. It further clears RSFLAG to zero so that no preread will be done. Before going to RWOPER, though, it decrements the counter of unallocated subsectors and then increments the subsector number in its allocation variables for next time.

If the next operation is a write, and it is to the very next subsector, then CHKUNA notices that the write-type is 0, meaning a write to an allocated area. First it checks the counter to see if any unallocated subsectors remain in this block. If not, it knows that this is a real write to an allocated area. If some are left, CHKUNA compares the seek variables for drive, track, and sector to its unallocated variables (remember that it incremented the subsector number) and finds that they match. It then knows that it is still in the unallocated data block and that a preread is not yet necessary. RSFLAG is cleared to zero to indicate that there's no preread, the unallocated sector counter is decremented, and the unallocated subsector number is incremented once more for next time before control passes to RWOPER. We'll get a clearer picture of how this operates when we examine the actual routine. For now, suffice it to say that a substantial increase in speed is the result.

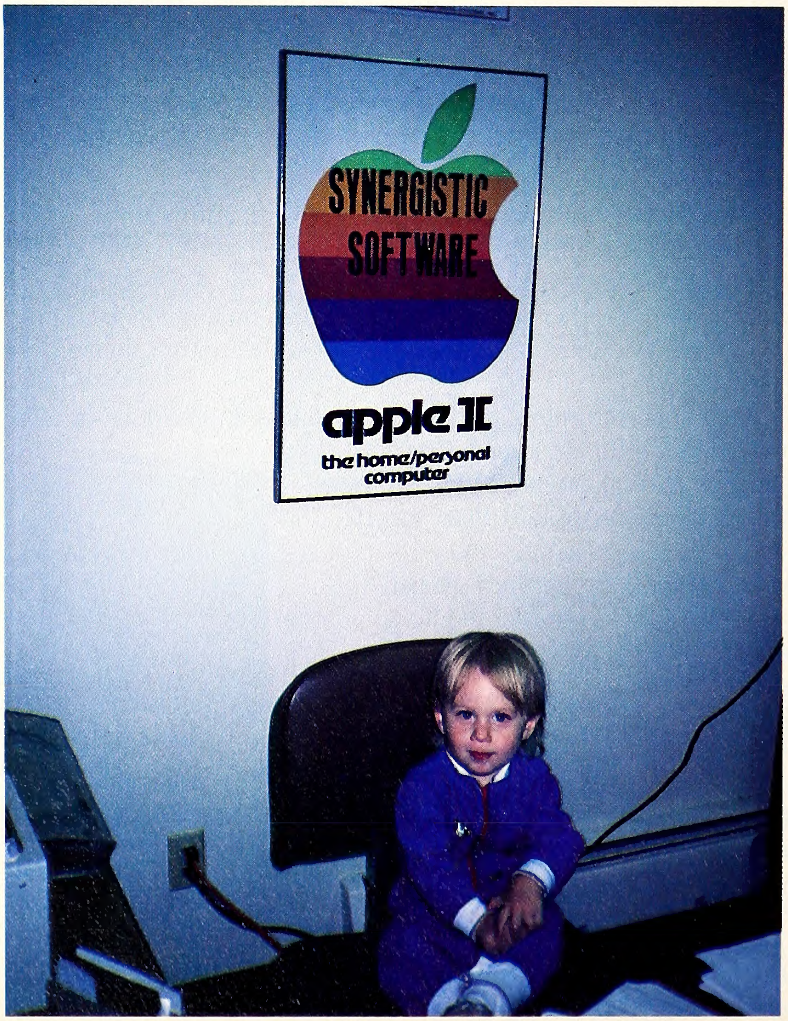
Next time we'll examine the various routines in step-by-step fashion as we have the other BIOS functions. Until next month. . . .

BY TOMMY GEAR

Nothing, it seems, grows faster than a newborn baby. Nothing, that is, except maybe a software publishing house whose commitment to producing high-quality products earns it a positive reputation among users and competitors alike. Babies require a lot of nurturing and care, a lot of love and hard work. The same ingredients are called for whatever the progeny if the venture is to be a success.

Bob and Ann Clardy had been supplying these essentials to their business, Synergistic Software, for almost four years when *Softalk* first told their story in the May 1982 issue. At that time, another beneficiary of this tried-and-true approach was the Clardys' young son, Derek. Baby and business have been growing at a geometric rate ever since. Derek, who's now two years old, already has his own set of disks, labeled with his name. And the growth of the company has put the Clardys at a crossroads as software publishers.

When first starting out, the Clardys conceived of software publishing as a three-month trial affair. Bob Clardy had been working swing shift designing radar systems at a Boeing plant in the Seattle area when friends and fellow members of the Apple PugetSound Program Library Exchange (A.P.P.L.E.) encouraged him to try to market a couple of games he had written in his spare time. Clardy originally introduced his programming efforts to these friends in 1979, in the form of the game *Dungeon Campaign*. In Clardy's first foray into selling his wares, this game was teamed on a single disk with another, *Wilderness Campaign*, which integrated hi-res graphics. The latter, now eminently collectible, was the first outdoor fantasy role-playing game for the Apple.

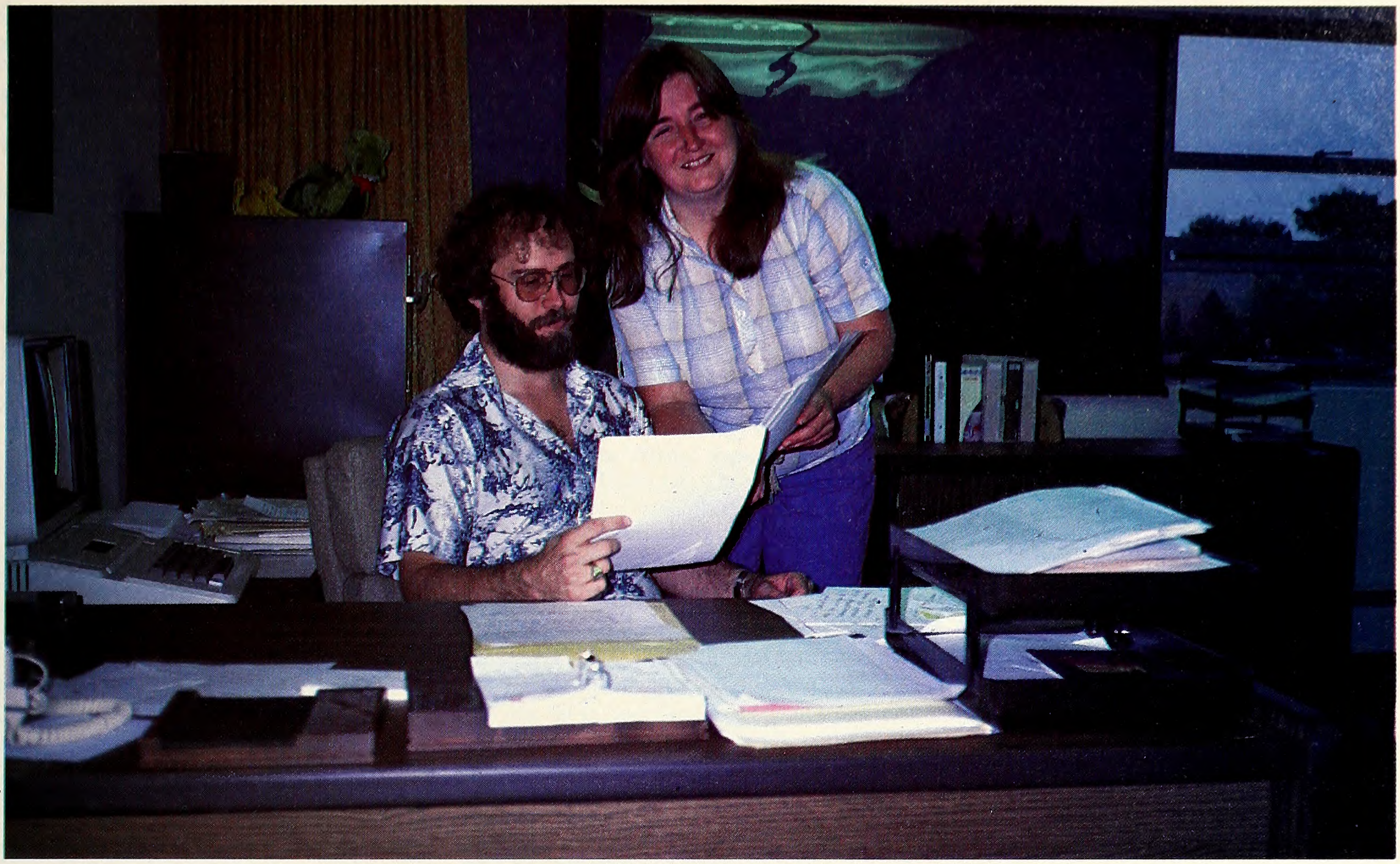


Hopeful but cautious, the Clardys had their confidence bolstered when the initial cash flow generated from sales of their first disk far exceeded their expectations. Given the name suggested by Ann Clardy's father, Synergistic Software was born. When the company proceeded to grow at a pace typical of a newborn, Clardy quit his job at Boeing. As he developed more programs, Synergistic's sales grew too, reflecting an insatiable appetite among microcomputer users for good game programs.

In November 1979, the Clardys began marketing *Higher Graphics*. Written by Bob Clardy, the program was one of the first graphic utility programs available for the Apple. That success was followed by another, *Modifiable Database*, the best of the two or three database management programs available in early 1980. At a time when there were few programming tools on the market, Synergistic released *Program Line Editor*, written by then-seventeen-year-old Neil Konzen, with whom Clardy had become friends through A.P.P.L.E. get-togethers.

Then came the Fifth Annual West Coast Computer Faire in San Francisco. It brought praise for Synergistic's products, and it sparked a series of inspired programming efforts by Clardy. Foremost among the releases to follow was the hi-res animated fantasy game *Odyssey: The Compleat Apventure*, originally written in Integer Basic and made available in Applesoft in 1981. Being a dungeon master in college enabled Clardy to bring a thorough knowledge of fantasy role-playing games to this creation. The adventure consists of three separate but interlocking programs. Unlike most fantasy games of the time, *Odyssey* accepts a number of different routes toward the goal without trapping the player or necessitating the retracing of steps.

Similarly, Synergistic's diversity of product reflects the many different paths to be explored



Photos by Tommy Gear

Opposite page: Two-year-old Derek Clardy, looking very much like an up-and-coming software executive, pauses for a milk break between bouts with *Dino Eggs*. Above: Bob and Ann Clardy work out the final details of a new publishing agreement for Synergistic's product line.

in software marketing. Synergistic's utilities have included *Soft Seventy*, which provides software-based seventy-column capability; *G.A.P.* (*Game Animation Package*); an Integer Basic compiler; and the enhanced *Global Program Line Editor*. Educational software from Synergistic has included *The Linguist*, a skeleton language translation and tutorial program; *The Communicator*, a speed typing and reading program; and *The Planetary Guide*, which teaches basic astronomy in hi-res. Synergistic's business packages and game offerings, both fantasy and arcade, have been even more extensive.

In 1981, *Modifiable Database* was updated to become *The Data Reporter*, a database management system. The program features report generation with data plotting and analysis capabilities that can be used in inventory control, accounts receivable, sales analysis, and as a bibliographic or memo reference tool. Other business programs include *Higher Text*, *Higher Text II*, *Inventory Manager*, and *Word Weaver III*, a word processor for the Apple III.

Synergistic has shown an exceptional knack for developing a range of challenging scenario concepts and inventive, fast-action situations. In addition to *Odyssey*, players have enjoyed *Campaign Trilogy*, *Apventure to Atlantis*, *Procyon Warrior*, *Nightmare Gallery*, *Escape from Arcturus*, and, more recently, *Crisis Mountain*, *Bolo*, and *Microbe*.

But now things are changing for Synergistic. As Bob Clardy sees it, given the way the market is evolving, a software company faces a crucial choice at a certain point in its success curve. It can either continue to grow, making gains as a software publisher through the infusion of venture capital by outside investors—a necessity for most companies to survive amid the onslaught of the biggies—or it can get out of the publishing game completely. This is the choice Clardy has made for Synergistic. But what does that really mean? Can we expect never again to see the unique approach and quality of design we've come to expect from the software produced by Clardy and crew? No way!

Synergistic is getting out of software publishing—it's true. Instead, the company is becoming an organization of authors who'll concentrate full-time on program development, free of the time-consuming concerns entailed in publishing. The arrangement should result in many more and exciting products coming from the Synergistic team.

Negotiating with other publishers who will begin to assume distribution of Synergistic's past releases has been the first item on Clardy's agenda for the future. Synergistic will also be converting programs to run on systems other than those for which they were originally designed. This will include products generated elsewhere as well as their own.

So far, it is certain that *GPLE* will henceforth be produced by Beagle Bros and that *Crisis Mountain* for the Apple will be marketed by the Micro Fun division of Micro Lab. Other popular Synergistic games and business packages will be converted for use on the whole array of microcomputers now available, with many different publishers involved. The Japanese publishing rights to a version of *The Data Reporter* written for the IBM Personal Computer have already been sold to Hitachi to run on that company's hardware—in Japanese, of course.

In spite of all the wheeling and dealing that Synergistic's realignment of efforts has required, Clardy and cohorts exhibit tremendous enthusiasm for the task of creatively applying their programming talents. New arcade and fantasy games are already being developed, many of which strive to present an environment in which the player interacts with the game in a more natural way. In a fantasy adventure game, for example, players won't necessarily be tied to a fixed set of circumstances but may be presented with a multitude of options within that game's universe. Or perhaps a better solution to a problem, or means of achieving a goal, will exist independent of the one provided for by the programmer. In other words, players will be devising their own unique, creative solutions as they play.

Synergistic's commitment to quality control as an essential element in the development of new products is in no danger—especially since the bottom line in that area is monitored by Ann Clardy. Her husband describes her as a professional user—someone who knows little about programming but has a sure-fire talent for unearthing the kinds of bugs that users could find objectionable. Little Derek Clardy clocks in his time as a junior professional user of sorts, too. His latest object of scrutiny is *Dino Eggs*, which occupies him for hours with its entertaining animation and amusing sound effects.

In the end, which publisher releases the new

programs developed by the Synergistic family isn't the most important issue. The most telling quality in any game or business package remains the degree to which that program's design reflects its developer's concern for the user. In Synergistic's case, that issue has never been in question.

Families as a Professional Concern. About one hundred fifty miles east and south of the Seattle suburb that Synergistic calls home, beyond the mighty Cascade range, near where the Columbia and Snake rivers meet, lie the tricities of Pasco, Kennewick, and Richland, Washington. Here, since 1981, Apples have been making a big difference to a group of social service workers who minister to local families and individuals in need.

An often transient labor force in and out of work at the nearby Hanford Federal Nuclear Reservation comprises a major segment of this region's population. Lutheran Social Services in Kennewick (whose story *Softalk* first told in May 1982) offers an array of services on a sliding-fee scale, aimed primarily at helping families cope with stressful situations and the experience of rootlessness not uncommon in such communities. Whether conducting family workshops, doing outpatient counseling, or administering programs dealing with divorce, adoption placement, and crisis intervention, the Lutheran Social Services staff has found that having Apple power has helped them serve people better.

When *Softalk* spoke to area director Dan Haygeman originally, he had just discovered how helpful *Zardax* could be in coping with the voluminous word processing problems that developing funding proposals for his nonprofit agency presented. He had also discovered the worth of Bob Clardy's *Odyssey: The Compleat Apventure* as a counseling tool.

Haygeman had on occasion played board games with young clients as a way of reconnecting with them during sessions in which communication had bogged down. "None of those games have anywhere near the emotional appeal of playing a computer game," states Haygeman. He says the types of choices players make in a fantasy/adventure context can be indicative of "where they're at" and are of value as conversation starters, springboards that may get a young person talking about feelings and self.

As of this year, a IIe has joined the Plus and NEC 5510 Spinwriter in serving the nine-member full-time staff, which includes counselors and clerical personnel. Haygeman continues to extol the virtues of *Zardax* for its ease of use—it's taken only about an hour for computer-illiterate staff members to learn to use the program for such things as follow-up correspondence with clients or clinical writing applications. He especially appreciates the print-spooling option, which takes advantage of the IIe's extra 64K and is available for no additional charge.

In addition, client data is now being managed using Sierra On-Line's *General Manager*, which permits conversion of its records to standard DOS text files for printing by *Zardax*. Haygeman also finds *VisiCalc* an essential tool in the development of grant proposals, which often require making projections to determine the impact of client load upon the agency's budget.

The Apple is also employed in the processing of data gleaned from clients' responses to the Leary Interpersonal Checklist, a diagnostic measuring device that evaluates both the way individuals perceive themselves and how others perceive them. The version of the checklist the agency uses was developed for microcomputers by Dr. Michael Nugent of Tacoma, Washington. Haygeman customized it by adding a response plotting algorithm that he developed with Bob Scherpeld, a local programmer who volunteered to help. Written in Applesoft, this portion of the program plots clients' responses to the checklist on a circular two-dimensional grid, graphically portraying the interpersonal perceptions and self-perceptions of the individuals involved. In clinical situations where interpersonal understanding might require a greater investment of time and money than a client could accommodate, using a tool such as this may bring meaningful progress more quickly.

The shrinking of available funding for social services nationwide has placed an additional burden on those responsible for maintaining quality service in the helping professions. "The voluntary sector is just not able to fill the gap," says Haygeman. He feels this is but a compounding strain on those who, by the very nature of their work, have embraced a vocation already fraught with so much stress. His solution is to try to find creative ways to do more with less. The Chinese character for crisis, he recalls, waxing philosophical, is a combination of two others: one that means danger and one that means opportunity. For him this represents the insight that threatening situations will often spark a positive change that might not otherwise have been made. Thus were the circumstances surrounding his original Apple purchase a couple of years back—an opportunity he seized and from which many continue to benefit.

A Friend to Those in Need. Back in 1980 a black Bell and Howell Apple at the Lincoln School for educationally and physically handicapped children in Boise, Idaho, started helping Leslie Evans express her outgoing and cheerful personality a little more easily. In 1980, at age sixteen, Leslie was an active honor student who loved to ride horseback. One day she was thrown from her horse, and her fall resulted in an extremely physically handicapping condition.

Leslie's story was featured in *Softalk*'s June

As a counselor of families and social services administrator, Dan Haygeman discovered that the Apple could save both time and money for an agency and its clients in need.

1981 issue—that's a little over a year after she was first introduced to the computer. A friend who worked at a local computer store had organized a fund-raising drive, through the Boise *Statesman*, that brought Leslie a home computer.

The Apple's contribution to Leslie's life has been primarily as a means of communication and self-expression. Leslie is unable to walk or speak, but she can hold a stylus and use it to type. Leslie still relies primarily on a single communication program, *Microcommunicator Version C*, written for the handicapped by Grant Grober and adapted especially for her. Now recently turned twenty-one, Leslie graduated from Lincoln last May. The school's work with handicapped students and Apples goes on.

Jim Schnur, a consulting teacher at Lincoln, was instrumental in introducing Leslie and fellow students to microcomputers. When the school acquired its first Apple, Schnur recalls, many people couldn't see the point of using a microcomputer in the school setting. Today, the school owns five Apples, shared by students and faculty, which are used in classrooms.

Schnur has worked with Lincoln vocational coordinator Kathy Jones in the development of a food service program. This program is used in a small cafe that's located in the school and staffed by the less handicapped students. One feature of the program helps the student staff with counting change, often a major accomplishment for the developmentally disabled or for those with limited reading skills. Each day, students can enter the data describing the menu selections for that day and the computer prints it out.

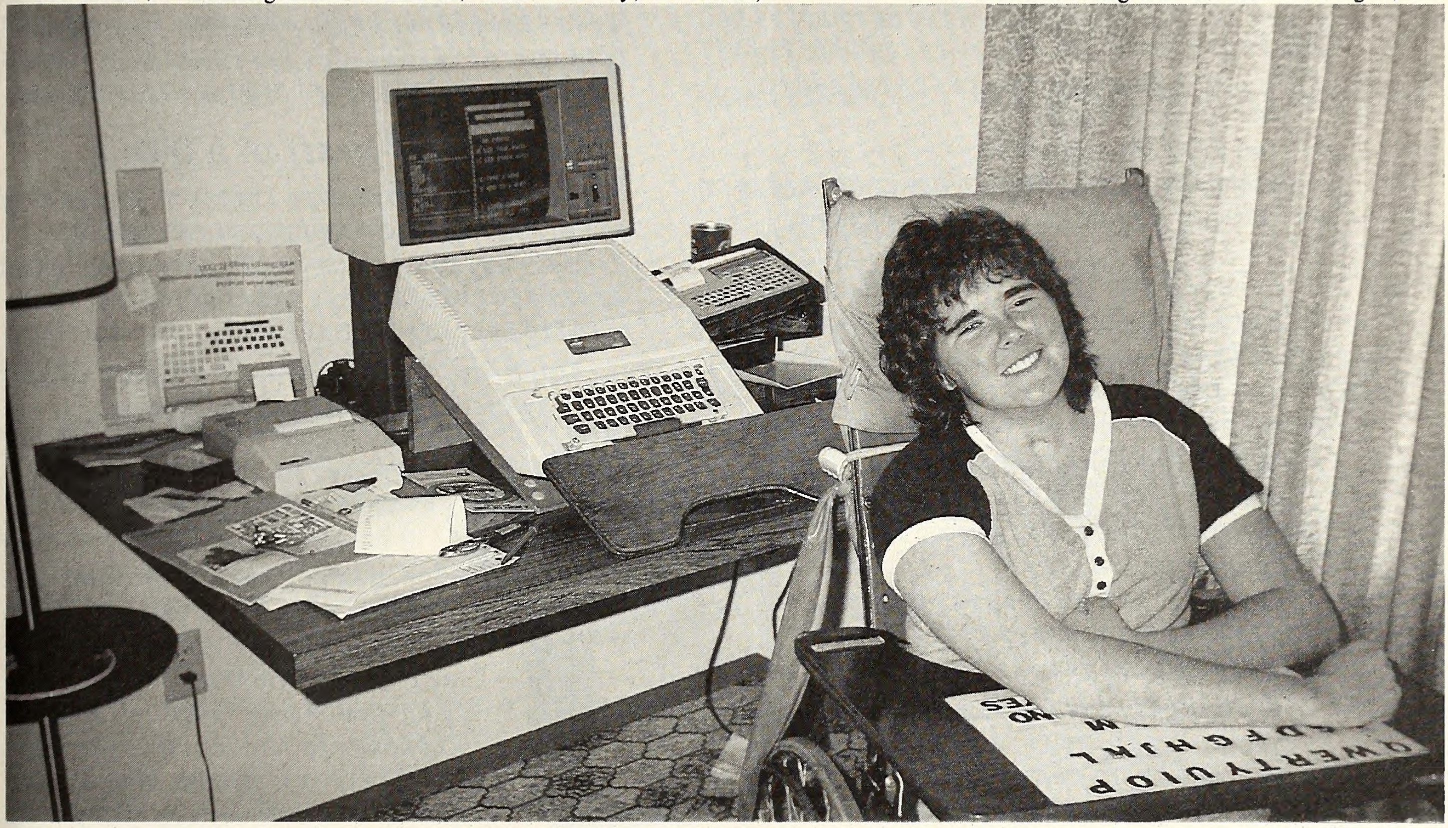
Teachers use other programs in their various classes, the most valuable of which is the *Blocks Authoring System*, developed at the California School for the Deaf by a deaf person. This program has been used extensively at Lincoln in a class that teaches survival skills, such as how to read signs and how to anticipate or deal with potentially dangerous situations.

Besides providing all the elements of a complete authoring program, this package contains a graphics library of eight hundred to nine hundred images that a teacher can insert in various ways into a composition, thereby enhancing the level of interest a subject might hold for the students. Among the images available in the program is the alphabet in finger-spelling. (*The Blocks System*, version 3.2, is available through the Softswap educators' exchange service, San Mateo Office of Education, 333 Main Street, Redwood City, CA 94063.)

Though the use of micros has far-reaching implications for bettering the lives of the handicapped and assisting those who work with them, in Leslie Evans's case the computer wasn't the miracle her family had hoped it would be. As Leslie's mother observes, the Apple has been a lifesaver as a tool, just by allowing Leslie the basic communication abilities. But that's only a start for this young woman whose handicap is so severe that holding her head up or swallowing can be a major effort.

This past spring a teacher came to her home to work with Leslie for an hour a week. The teacher, Steve Muffley, whom Leslie's mother describes as "a brilliant young man," has cerebral palsy, with no use of his arms or voice. From his electric wheelchair, by typing on the Apple keyboard with a stylus that he holds in his mouth, he showed Leslie how to use *Bank Street Writer*. The process was slow-moving and hard, but the two were making progress. Then the Social Security rehabilitation program that sponsored the lessons dropped Leslie from its rolls, deeming her a bad employment risk further down the line.

When summer came, Leslie had summer camp to look forward to. This was the fourth year she had gone for the one-week outing in McCall, Idaho, sponsored by United Cerebral Palsy and staffed by volunteers from the nearby Mountain Home Air Force Base. Afterward, Leslie wrote a piece about her experience at camp for the cerebral palsy newsletter. A high point of the week for Leslie was horseback riding, which she loves. The experience was made possible by having someone else ride with her on the horse. An avid equestrian before her accident, Leslie also enjoyed a visit with the bareback riding club she used to belong to, and she saw them perform when her family traveled in their van to a local rodeo.



The Apple has enabled Leslie Evans, handicapped since she was sixteen, to communicate her thoughts and feelings in the exercise of her writing skills.

Recently, through the Elks Rehabilitation Hospital in Boise where Leslie attends therapy sessions two days each week, she acquired a slider device that makes it possible for her to feed disks into the drive by herself. Leslie's mother now hopes to find a method whereby Leslie will be able to turn the computer on and off by herself too. The one limiting factor to adapting the computer to accommodate Leslie better has been a lack of resources in that region of the country—both resources for the handicapped and resources for ordinary computer users are hard to come by in Idaho.

In spite of all she's had to contend with, Leslie retains a cheerful spirit and an optimistic attitude. The Apple helps a lot because Leslie Evans loves to write—stories, poems, letters, anything. The Apple helps to create a bridge between her active mind and the world.

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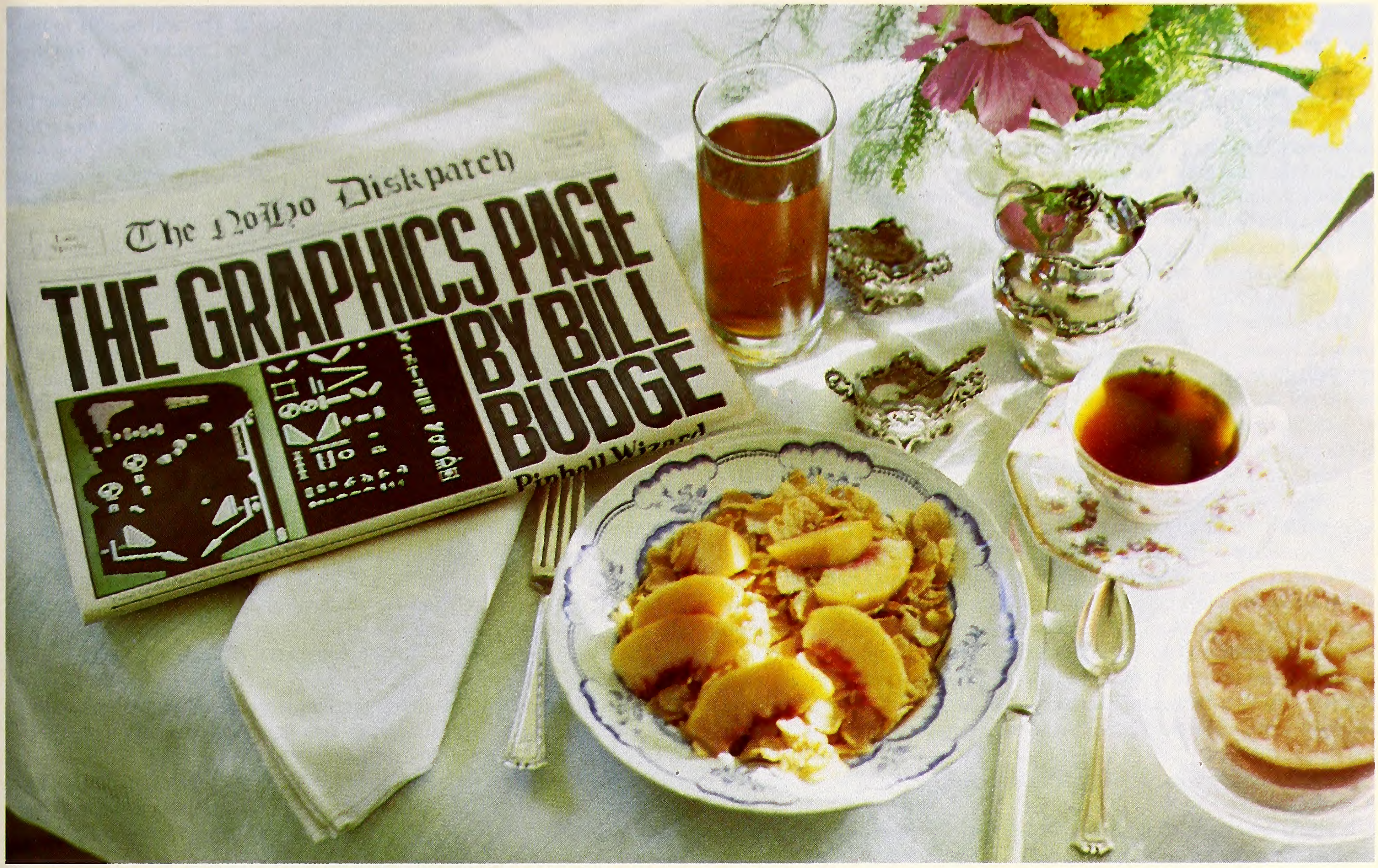


Zen and the Art of Raster Graphics

We now consider the 53,760 dots on the Apple II high-resolution graphics display. Each of those dots can be turned on or off independently of all the others, which means that there are at least $2^{53,760}$ *(or* $10^{16,183}$*) possible distinct images on an Apple screen. Out of this enormous number, we wish to find those very special patterns that educate, clarify, or entertain. Our task, then, is to develop methods for controlling our dots, to turn them on and off in ways that are good. In spiritual terms, we seek the Buddha as He manifests Himself in dots.*

—Swami Mahareeshi Bujramdas, ancient master

The field of computer graphics is well established, and microcomputer graphics occupies only a small and relatively minor part of it. The problems that researchers are currently interested in concern the generation of extremely realistic images on very high-resolution displays. You can see the results of such work in the special effects of such movies as *Tron*, *Star Trek*, and *Star Wars*.

Graphics, the Final Frontier. Now what does *Star Wars* have to do with Apple computer graphics? Unfortunately, not much. Anything we do on the Apple II is going to seem primitive compared to the state of the art. While the wizards at Lucasfilm, the Jet Propulsion Laboratory, and the New York Institute of Technology explore fractals, models of reflection, and VLSI architecture for computer graphics hardware, we can only hope to learn some of the fundamental techniques. At least for now. . . .

The constraints imposed by our little Apple II computer are sometimes formidable and can seem crushing to people used to working on bigger computers. Yet we usually demand a higher degree of interactivity from the spreadsheets, word processors, and video games that we run on our Apple computer than from the equivalent programs running on minicomputers or mainframes.

This situation presents us with an impossible and therefore worthwhile challenge. To meet this challenge—to create great graphics on our screen—we must find the most efficient methods for creating images on the screen and implement them effectively in software. Of primary importance is the design of the methods, or algorithms. If we are working from faulty or inefficient algorithms, even the greatest coding virtuosity won't save us. Good programming skills are also important, however, as many good algorithms have been smothered under layers of bad code.

We do have a few things going for us. Since the Apple is a personal computer, we don't have to share it with anyone. We have that 6502 microprocessor and its memory all to ourselves, and we can make our own rules. Rule 1: We will do everything we can to make our programs run fast.

And as we will discover, the architecture of our Apple is particularly well suited for fast and interactive graphics. One of the most critical factors in the speed of graphics operations is the interface between the central processor (in our case, the 6502) and the dots on the screen. We can thank Steve Wozniak, the Apple's designer, for making this interface simple and fast. At maximum, we can change the screen at a rate of seven dots every four milliseconds, for a communication speed of 1.75 Mbaud. That is very, very fast.

Because implementation issues are so important on microcomputers, this column will sometimes be as much about programming as it is about computer graphics. Most people find the basic ideas behind computer graphics to be natural and intuitive, but the details of implementing those ideas can be a little more mystifying. For that reason, we'll direct our attention to programming problems every once in a while. This is where a lot of people seem to get stuck.

This column is meant as an introduction to computer graphics, so we'll start out learning to draw some fairly simple kinds of objects. We'll begin with the simplest ones, such as rectangles and lines, and work our way up to circles and polygons. We'll also find out what bit maps are and how to draw them on the screen. Finally, we'll learn about graphical operations like windowing, clipping, rotation, translation, and scaling. One thing we'll learn is that being able to draw these simple objects and perform a few operations on them can take us a long way.

One thing we'll try to avoid is a slant in the coverage toward using graphics in any particular type of application program. Thus, what is written here should be of as much interest to the word processor designer as it is to the video game hacker. With the explosion of graphics-related user interfaces like joysticks, trackballs, and bit pads, all the way up to the mouse on Apple's Lisa, programmers need to be able to blast those dots for all sorts of applications.

So far, so good. But now we must face an unpleasant consideration.

We want to write some programs to test our ideas. What language should we use to implement the programs? There is nothing inherent in graphics that requires us to do anything in assembly language. We could just as easily use Pascal or Basic. The reason we won't is that these languages run too slowly on a microcomputer like the Apple. Since graphical operations change large amounts of screen data and tend to get used a lot, it's important that they run quickly.

Using assembly language is no guarantee, however, that a program will run quickly enough. Some applications like real time flight simulation are so demanding that even the best software must be supplemented with special-purpose digital hardware if the graphics are to be generated at the required rate.

The Call of the Hacker's Code. We can't afford to build special-purpose hardware, but, as it turns out, we don't need it. We can draw polygons or aliens as fast as we need to by using software alone, as long as our designs are good and we pull every trick in the book to make our code run fast. Programming tricks (or hacks, as they are sometimes called) are not very respectable in the computer science world, but pulling these tricks is a lot of fun and can actually become an art in itself. Hacks will definitely be a topic in this column.

So we will be programming at the lowest software level available on the Apple. While there are a number of excellent books on assembly, it's still the hard way to program, even if you aren't trying to be tricky. It will be assumed in this column that you know something about assembly language and the hexadecimal number system. If you do, you might be able to understand and even modify the program listings. If you don't, you should still be able to read the column when it deals with computer graphics. Just skip the sections marked with an asterisk, which dwell on low-level implementation issues. And take comfort in this: Assembly language is for nerds.

(* For assembly wizards only: All other programming languages are for nerds.)

It would be nice if, after reading this series, we came away with more than just the experience of having read it. Therefore, this column has been carefully organized. Over a period of time, a complete set of programs will be developed. At the end of the series you will be able to use these programs as a self-contained package to implement your own graphics programs.

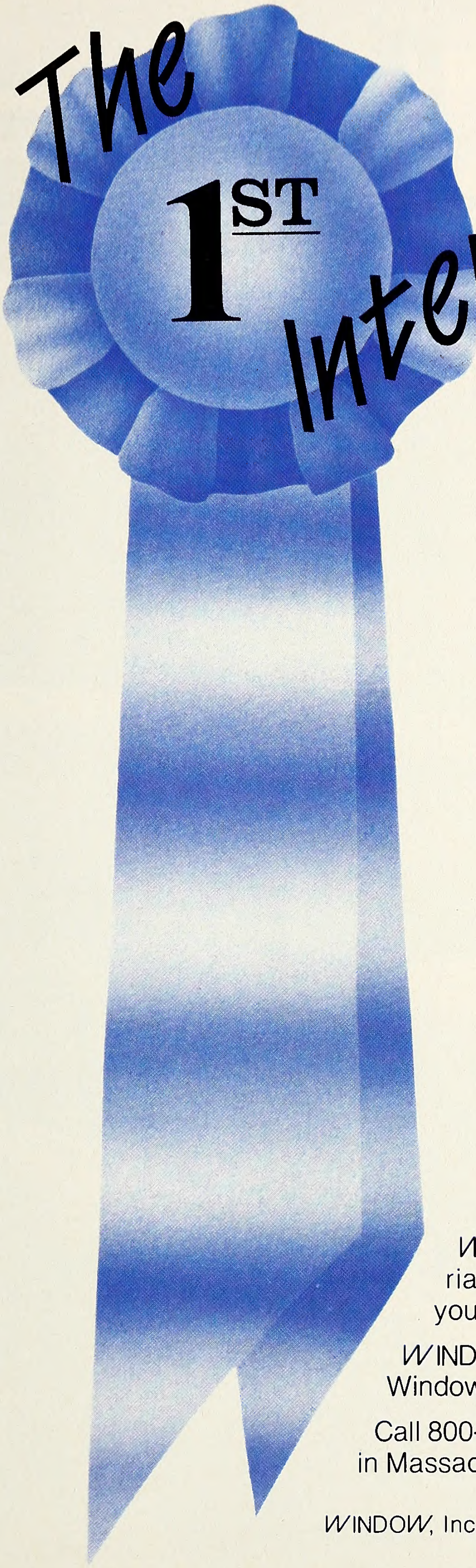
More Unpleasantness. We need an editor and assembler in order to write this graphics package. At the risk of angering every software publisher who puts out an assembler, we won't recommend anyone's product, since each one has some fatal flaw. There seem to be two separate schools on the design of editor/assemblers. The "leftist" school believes in simple assemblers with limited editing capabilities, while the "rightists" create complex systems with every feature imaginable. The problem is that the left-wing products, while flexible and very fast, make editing a frustrating task. This is bad, since most programming time is spent editing. The right-wing systems usually have editors with more features, but the user interfaces are complex and unforgiving. What's more, assemblies can take forever with the more complicated assemblers, and you find that some of the things you want to do are prohibited and won't assemble.

To remain nonpartisan, the listings in this column will be in the format required for Apple's *Edasm* editor/assembler. This product is readily available, well supported, and comes in standard DOS 3.3 form, so it can be used with RAM-based pseudodisks and hard disks. It's fast and has a reasonable line-oriented editor, and the latest version works great with the IIe. The current *DOS Tool Kit* contains this assembler plus the *Bugbyter* debugger, making the package a powerful set of tools for developing assembly language programs.

One final note. The listings that go with this column will be long, and it doesn't make much sense for everybody to have to retype them; so a disk will be provided containing the complete set of source and object files. You'll have to have *Edasm* to look at, modify, or assemble these files. More on this in a future column.

For now, let go of your inhibitions and prepare yourself to receive the secrets of Apple hi-res graphics: the weird binary tables, blazingly fast unwound loops, and bizarre self-modifying codes that let us blast those dots.

Next month: de-Wozzing your Apple.

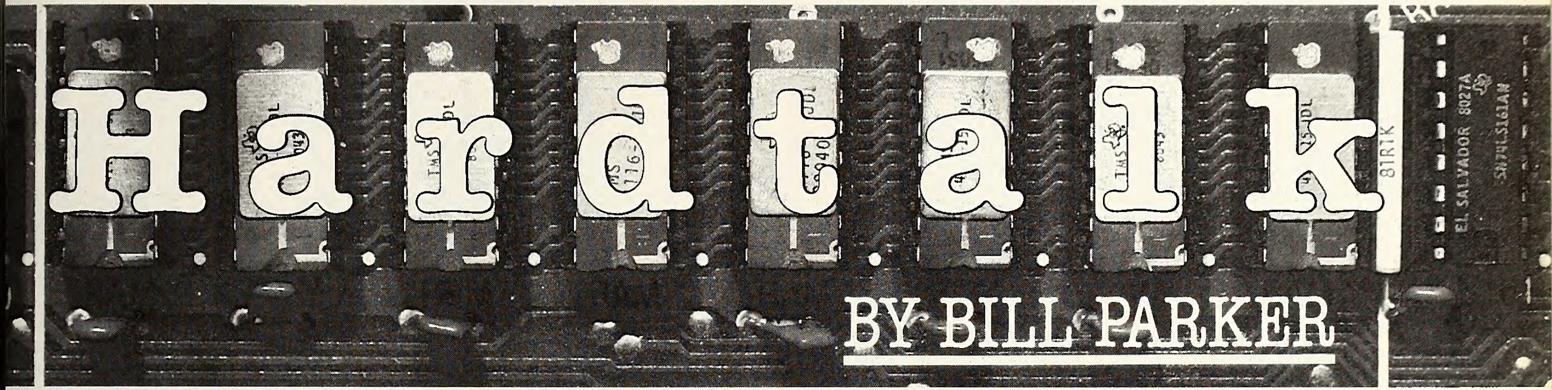

1ST


Drawing take some getting used to to. Its important to realise,
for example that the the delta cursor always begins drawing from
it's current position and heading. This means that, when you
execute a storred program it may not look the way it did
And, as good as this program is it it does have some
EPSON
issue half-move and half draw commands (done by prefacing the
command key with control), both of which enable you to make your
drawings more detailled an specific. The erase command, E, allows
you to errase the last command action you took.
Several qualties make this program more then and different
from a sort of "coloring book on screen". To begin with, the
EPSON
Users of this class-tested program will learn about lines,
shapes and colors, and they'll also become more adapt at
recognising patterns and thinking in vizual terms. The program
also helps learner's become more confotable wth computers,
introducing them to the kind of deliberant step-by step approach
that is required for solving problems on the computer.
EPSON

We'll begin this column with the first of a series on one of the most popular printers in use today for the Apple, the Epson dot-matrix printer.

The Epson can be found just about anywhere an Apple is because, when it first came out on the market, the Epson was one of the few printers to have the unbeatable combination of affordability, reliability, an easily replaceable ribbon, and special print functions. The problem with it is the documentation and (until the introduction of the FX) the constantly changing printer operating system.

The original documentation for the MX printer has been referred to by some as the "Radio Shack Joke Book" due to its orientation to the TRS-80 personal computer, the attempts at humor by the author, and the running-commentary style of writing. Users have complained that the sample programs in the book do not work with the Apple and that it is



Printing Out Has Its Epson Downs...

difficult to wade through the jokes and commentary to find just the information needed.

The Epson also went through quite a bit of development. It began as an all-but-extinct printer called the TX, ran the gauntlet with the MX series, and then finally blossomed forth into the FX and now the RX printers. The MX series is where most people have problems.

Difficulties arise with the MX printer because there are six different models, each having its own operating system and each capable of doing radically different functions. Here are the models:

Model	Printer Operating System
MX-70	Original MX-70
MX-80	Original MX-80
MX-80	Graftrax 80
MX-80	Graftrax Plus; also known as "Type III"
MX-100	Original MX-100
MX-100	Graftrax Plus; also known as "Type III"

It is important that you be able to identify the *exact* type of MX printer that you own. This is the only way you can figure out how to get the special functions of the Epson to work. Identifying the MX-70, MX-80, and MX-100 is straightforward enough: That information can usually be found on a model plate on the front of the machine or on a foil label on the back. Also, the MX-70 has a two-tone chocolate color, the MX-80 is fourteen inches wide, and the MX-100 is nearly two *feet* wide.

The problem comes in trying to identify what kind of operating system you have in your printer. The first one, the MX-70, is easy: It has only one operating system, the original MX-70. Turning on your printer and running the following simple program will distinguish the others:

```
10  LET ESC$ = CHR$(27)
20  HIBIT$ = ESC$ + ">" : LOBIT$= ESC$ + "="
30  PR#1
40  PRINT HIBIT$ : PRINT CHR$(185) : PRINT LOBIT$
50  PR#0
```

Result A: ▚ (block graphics character = Graftrax 80)
Result B: *9* (italicized "9" = Graftrax Plus)
Result C: 9 (normal "9" = original MX-80 or original MX-100)

That was simple, wasn't it? Now that you know exactly what type of Epson you have, let's see what they can do:

MX-70: Normal and expanded text modes; dot-addressable graphics (can do a hi-res screen dump); programmable line spacing and form feeding; "delete"-type backspacing.

MX-80 (original): Twelve print modes using normal, emphasis, expanded, and condensed; programmable form feeding, horizontal tabbing, line spacing, and vertical tabbing. Cannot do a hi-res screen dump but can print block graphics if a printer interface card is used that can transmit the most significant (high) bit.

MX-80 (Graftrax 80): Twenty-four print modes using normal, emphasis, expanded, condensed, and italics; programmable form feeding, horizontal tabbing, line spacing, and vertical tabbing; most-significant-bit-control; home printhead; "delete"-type backspacing; redefinable escape codes. Can do a hi-res screen dump.

MX-80 (Graftrax Plus): Twenty-four modes using normal, emphasis (which can be "locked on"), expanded, condensed, and italics; programmable form feeding (improved), horizontal tabbing, line spacing, and right margin; most-significant-bit control; foreign alphabet symbols; home printhead; true backspacing; redefinable escape codes; skip-over-perforation control; subscription and superscription; underlining; unidirectional printing. Can do a hi-res screen dump and also has "line" graphics.

MX-100 (original): Twelve print modes using normal, emphasis, expanded, and condensed; programmable form feeding, horizontal tabbing, line spacing, right margin, and vertical tabbing; most-significant-bit control; "delete"-type backspacing; foreign character sets; skip-over-perforation control. Can do a hi-res screen dump.

MX-100 (Graftrax Plus): Twenty-four print modes using normal, emphasis (which can be "locked on"), expanded, condensed, and italics; programmable form feeding (improved), horizontal tabbing, line spacing, and right margin; most-significant-bit control; foreign alphabet symbols; home printhead; true backspacing; redefinable escape codes; skip-over-perforation control; subscription and superscription; underlining; undirectional printing. Can do a hi-res screen dump and also has "line" graphics.

FX-80: Fantastic printer; 160 cps or 80 cps in a special, "Blue Thunder"-type "quiet mode"; downloadable, define-your-own character set; proportional spacing; reverse line feeding, and so on. Will be covered in a separate column.

RX-80: Economy, no-frills model. Will be covered in a separate column.

As you can see, there is a wide variety of special functions your printer can perform. Some models can do things that others can't and there is some overlapping of features between models. Don't worry if you don't understand what some of the features mean. This column will

try to explain those things. To make life simpler, Epson has discontinued manufacturing all but the Graftrax Plus models, the FX-80, and the RX-80.

Let's take a look at some of the more common questions and problems with the Epson. They fall within the following categories:

1. Printer hardware. This would include paper-out condition, tractor feeding, sheet feeding, care and feeding of the ribbon, maintenance tips, and switch settings.
2. Printing from program control. This would cover using printer functions from Applesoft, Pascal, assembly language, CP/M, and so on.
3. Printing from word processor control. This would include prepackaged programs that reduce your ability to control the printer directly.
4. Printer interface cards. This would cover the mysterious "MSB" (most significant bit, bit 7, or high bit) and the ins and outs of sending characters to the printer.
5. Graphics. This would cover hi-res, lo-res, and text screen dumps, as well as more exotic things such as strip chart recording, artwork, and garden-variety doodling.

Let's start at the beginning with printer hardware questions. First, let's take the problem of the paper out condition. The Epson is configured to stop printing and to buzz when it runs out of paper. This can be annoying when you're trying to feed single sheets of paper through the printer. The problem can be solved by flipping a switch within the printer or by sending a turn-off code to the printer, but it is a heck of a lot easier just to stick a business card or a scrap of paper down the paper feed slot until you feel (and perhaps hear) the paper trip switch click. Just tape the card in place and now the Epson will be tricked into believing that there is always paper in it. You can put sheet-fed or form-feed paper in the printer as before, just by sliding the leading edge of the paper under the card.

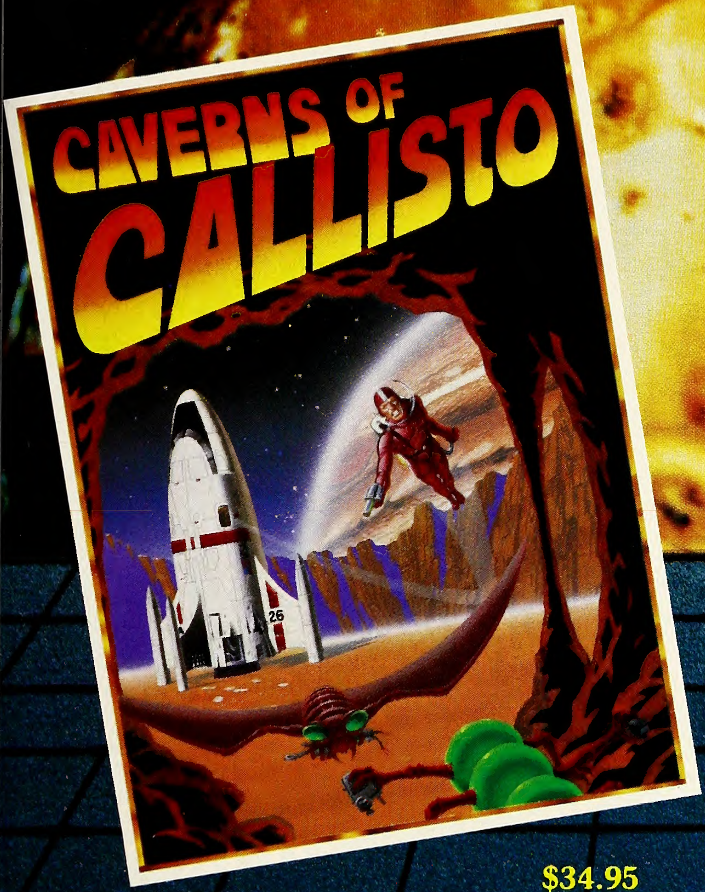
The ribbon is an interesting topic. The original cartridges put out by Epson had a sticker on the top that said "Exchange Times" to allow a ribbon reloader to circle the number of times a new ribbon was placed in the cartridge. That scheme was abandoned by Epson, although it seems to make pretty good sense now. Judging from a conversation held recently between the author and a ribbon re-inker (talk about cottage industries springing up around the Apple!), apparently the best way to handle a ribbon is to buy a first-rate, high-quality, brand-new ribbon cartridge and, when it wears out, to have it reloaded by someone with the proper skills and equipment—unless you like breaking obscure pieces of plastic and having a greasy ribbon squirt all over your clothes. This is a controversial topic, so any responses from readers with experiences to the contrary will be welcomed. The cheaper ribbons apparently do not last as long as an "official" reload, and they save money by scrimping on springs and other internal parts that maintain tension on the ribbon. If there's no tension, the ribbon falls down into the gears, kinks, or smudges the paper.

By the way, our re-inker points out that, when the ribbon's a little worn, you can squeeze some more life out of it by twisting it. The best way to do this is to remove the cartridge, twist the ribbon, and turn the ribbon advance knob until the twist "takes." Put the cartridge back in the printer and the printer will print on the unused lower half of the ribbon. After a complete trip through the cartridge, the ribbon will accept the change and remain inverted, but without the twist. As a final suggestion, there's nothing quite as handy as a pencil tip for pushing the ribbon down in front of the printhead.

Maintenance is simple. Look inside your printer just underneath the ribbon. You'll probably see public enemy number one: paper and ribbon debris. Don't fret; it's easy to remove. Once every three months (or whenever the accumulations become exceptionally gross), you should remove the ribbon and printer case and gently brush all that stuff out with a soft brush.

Printer switch settings raise a lot of questions, and well they should. They control whether you will single- or double-space, be able to get special characters, turn off that doggone buzzer, and so on. The pesky little things are deep within the Epson; you'll have to remove the printer's case to get to them. They consist of two little black boxes, each with a row of tiny white switches on top. They are soldered in place in case you have any ideas about moving them to the outside of the printer. And they are small. You will need something approaching a jeweler's

Two Great Games From Out of This World!



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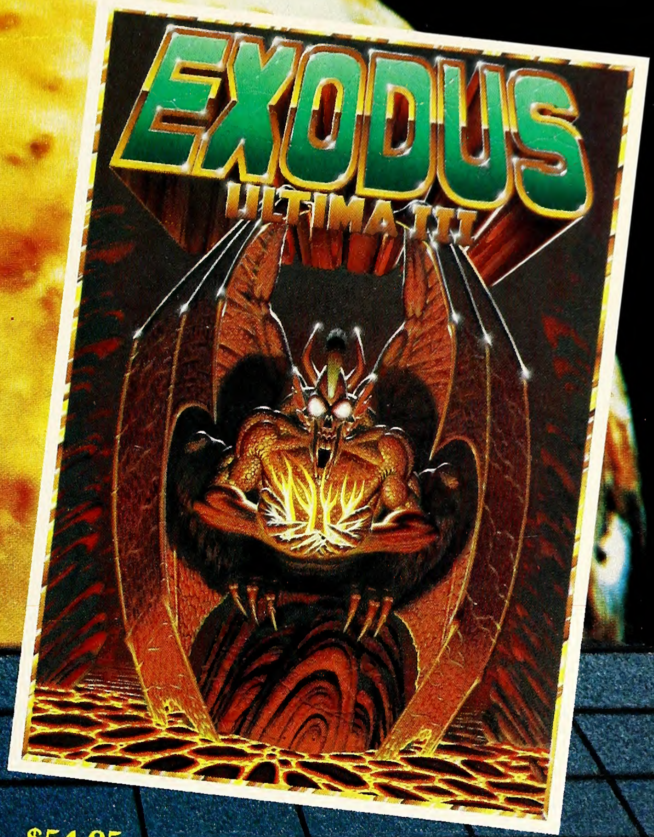

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screwdriver to flip their switches. (In a pinch, an unfolded paper clip will do.) Looking at the boxes from above the printer, you'll see that there is a smaller box on the left (SW-2) and a longer one on the right (SW-1). Each white switch on the box is numbered from the bottom (bottom referring to the printhead side of the printer), beginning with 1. The switches are referred to as 2-1, 2-2, 2-3, 2-4 and 1-1, 1-2 ... 1-8. Figures 1 and 2 give the proper settings for two of the more common printer operating systems, Graftrax 80 and Graftrax Plus (some settings reflect personal preferences; you may certainly change any that you don't like).

That covers the printer hardware controls. Next month we'll see how to control the printer from within a program.

Switch 2

	On	Off	
4		x	TRS graphics
3		x	Auto LF after CR
2		x	Not used
1		x	Not used

Switch 1

	On	Off	
8	x		Software selectable
7	x		Slashed zero
6		x	Buzzer
5		x	Emphasis on power-up
4		x	Italics on power-up
3	x		LF if buffer overflows
2	x		Kill auto LF after CR
1		x	Condensed on power-up

Figure 1. Recommended settings for MX-80 (Graftrax 80).

Switch 2

	On	Off	
4		x	Auto SOP
3		x	Auto LF after CR
2		x	Not used
1		x	Not used

Switch 1

	On	Off	
8	x		Software selectable
7	x		Slashed zero
6		x	Buzzer
5		x	Emphasis on power-up
4		x	Italics on power-up
3		x	Paper-out sensor
2		x	Not used
1		x	Condensed on power-up

Figure 2. Recommended settings for Graftrax Plus.

Auto LF: Automatically supplies a line feed after a carriage return to cause the printer to space to the next line after printing a line of characters. This is normally the job of the printer interface card, so the printer should not be set to do auto LF.

Buffer: The Epson has a built-in storage area for characters sent to it for printing. The printer waits until it receives a carriage return or too many characters (usually 80) before printing the contents of the buffer.

CR (carriage return): Causes the printer to print all of the characters stored in its buffer.

LF (line feed): Causes the printer to advance the paper one line.

Software selectable: A command that causes the printer either to ignore (without hanging the system) or to accept characters sent to it for printing.

Slashed zero: A zero with a slash through it to ensure that it is not confused with a capital "O."

SOP (skip-over-perforation): Automatic margin at the bottom and top of fanfolded paper. Useful with straight dumps, program listings, and so on.

Bill Parker is the author of The Other Epson Manual, *an unofficial guide to that popular series of printers; an expanded version is being published by Quality Software. He is also a staff writer for* Call-A.P.P.L.E., *a teacher of Apple assembly language at UC San Diego and San Diego State, and the head of Cut the Bull Software, among other things.*

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Apple®-Cat™ II

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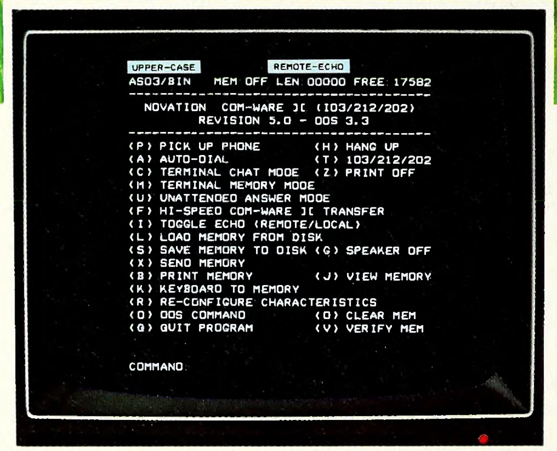

The Cat system lets you slip something into your Apple II no other modem offers—a complete range of speeds from 110, 300 and 202 half-duplex—to full duplex 212.

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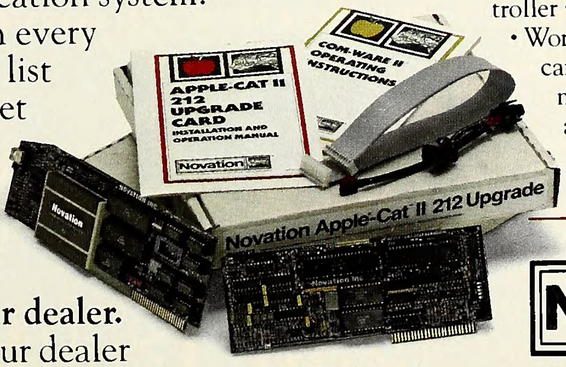

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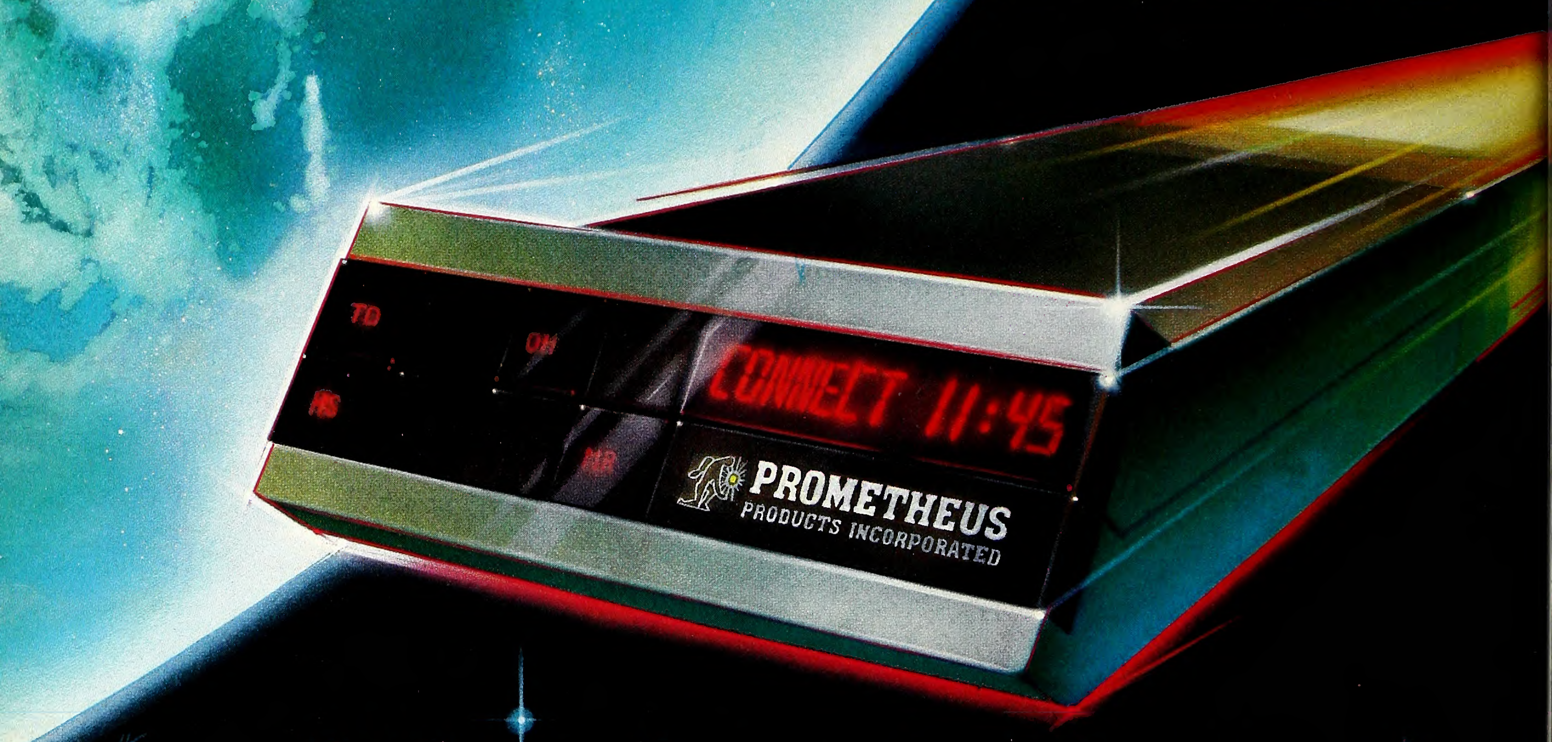

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PROMETHEUS

KEYS TO THE WORLD BY MATT YUEN

Rats. You're at work, and you realize that you forgot to set the timers to turn on the lawn sprinklers at home. No problem. Just dial up your home computer and have it set the timers for you.

Rats again. The stock market quotes will be coming in at seven o'clock tomorrow morning, but you won't be there to download them on the office computer because you'd planned on staying up late tonight and watching David Letterman. Knowing that you'll be deader than driftwood in the morning, you simply dial up your office computer and program it to retrieve the market quotes for you.

These are two entirely different scenarios that are both possible with today's microcomputer telecommunications. But what about the future?

Drat. Your son left for the lunar colony today and you couldn't make it to the launch pad in time to remind him to take his vitamins while he's away. Oh well, better call up his computer at the colony and leave a message. Let's see, that's two satellite hook-ups, since the moon is on the opposite side of the earth in the morning. Hmm . . . that'll cost a little extra.

Double drat. Mom took the laser floppies you wanted to make backup copies of. Maybe you can catch her on her way to work. It's a good thing she's wearing her crystal Apple (voice-recognition wrist version 2.2). What a pain if you had to wait until she got to the office. "Hi, mom. How's the traffic? Good. Say, you know those disks you put in your locket this morning. . . ."

That may seem far-fetched today, and it might seem just as improbable decades from now; but the point is that it's possible. But the distant future isn't what this column on telecommunications is about. We're more interested in the present. Yet, a funny thing about the future is that it eventually tends to become the present. We'll be keeping an eye on the future, trying to see how much closer telecommunications gets to being there each day.

Computers and modems. That's what this column is all about. It doesn't matter if you're interested in telecommunications as a hobby or for business use; we'll be covering both of these areas in the months to come.

This isn't going to be a technical column. We won't be learning how to build modems or how to write telecommunications programs. In short, we won't be doing anything that requires a technical mind or a scientific background. It's not because we're biased against techies, but because there are good places for technical jargon and programming exercises, and this isn't one of them.

This is the place for people who want to find out what's going on in the ever-changing world of computer communications. The questions we'll be looking at include: What's new? Is it available yet? Can I use it? Is it any good? How much does it cost?

If it sounds like we're trying to cram a miniature magazine into these few pages every month, it's because telecommunications is a field that's as varied and complex as computers themselves. Currently, there's hardware, software, and just about every device and service one can imagine available for people interested in making their computers talk with other computers. That's right, talk.

Before we go any further, there are two terms we ought to define in order to get everyone thinking on the same level.

Telecommunications actually refers to any communication using telephones, radio, television, or telegraph. In other words, it means communicating electronically. For the purposes of our discussion, we'll thumb our noses at the dictionary and take the term to mean simply communication between computers.

A *modem* is something needed in order for the computer to send and receive information. There's no way around them; you have to have one. And we'll discuss them in more detail later.

Lesson One: Self-Defense. When you tell fellow computer friends that you bought a modem for your Apple, they usually ask you the same question your noncomputer friends asked when you told them you bought a computer: "Oh yeah? Whatcha gonna do with it?" The usual answer is, "Are you kidding? All sorts of things!" Then you try to think of some.

The truth is, a lot of hobbyists buy modems because it just seems like the thing to do. There are those who add modems to their computer systems and can't imagine how they got along without them; and there are those who play with their modems for a few weeks and then rarely use them again. In both cases, the modems were purchased out of curiosity.

It's not the same for businesses; they usually have valid reasons for getting into computer communications, and such an investment can save money in the long run. Sending business memos and sales reports, connecting to distant computers to receive stock market information, and teleconferencing are some of the "serious" applications of modems, applications that more than justify the cost of adding a modem to the office computer.

Hobbyists, however, get into telecommunications for the same reason they got into computers—to find out what it's all about.

These are simplified reasons why we add modems to our Apples. For transcendentalists and Zen fanatics, we can ask: "Are there deeper, more meaningful reasons?" Well, yes.

If you can think of the computer as a medium, then it's not hard to imagine people communicating with each other through their computers. To illustrate, consider the following situation.

The Hole-in-the-Wall Gang. Imagine a man in a room by himself, completely shut off from the world. He has all the necessities of life (shelter, food, water, a controlled environment), so he has no need for anyone else. Now suppose he breaks a hole in the wall of his room. When he looks outside, he sees many more rooms just like his, each with someone living inside. Soon, the people in those rooms break little holes in their walls, allowing them to see outside as well.

Assuming they can't (or don't want to) climb through the hole to the

outside, they begin exchanging messages with each other by shouting. They are communicating.

Before the man in the room discovered other people in other rooms, he was already communicating—with himself. Four things that communication requires are a sender, a message, a medium, and a receiver. Thinking, wondering, and pondering are all forms of communication; the sender and receiver are the same person and the medium is the brain. When the people in the rooms broke holes in their walls, they discovered other potential receivers of their communications.

And that's how it is with computers.

When you use the Apple to figure out finances, write letters or manuscripts, play games, or do anything else computers are used for, you're communicating with yourself. You input (send) a message, the computer (the medium) analyzes it, and it then outputs something you receive.

Theorists might argue that you're communicating with the computer, that true communication requires the message to be understood by the receiver, or that you're really communicating with the person who wrote the software you're using. That all makes for fine philosophical discussion. But we'll just accept the computer as an extension of the mind. When we use it, we're using our minds, and we're communicating with ourselves.

Seen this way, the computer is like a disconnected telephone; you can talk, shout, whisper, scream, or sing into it all you like, but the only voice you hear is your own. Of course, the telephone wasn't created with just one person in mind; it was created so people could talk to each other. The computer wasn't created with only one person in mind either, but its use by just one person at a time is very common; it doesn't need another computer to function properly.

However, there are other computers out there—millions of them. And, if they could communicate with each other, what would they say? They probably wouldn't say much, since they still depend on humans to make them communicate. Sure, there might be a few that connect to other computers at specified times during the day, but all that was programmed by a human.

Before we go any further, let's take a look at how computers communicate with each other.

Bits of Logic. Though sometimes referred to as a complex mathematical calculator, the Apple is actually a logical machine. This doesn't mean that everything it does makes sense to us. The Apple deals with information in a logical manner—either something is "true" or it's "false." The computer represents true and false values by thousands of electronic switches that are always either on or off. In order to make things easier to understand, we picture these switches as being either a 1 or a 0, representing "on" and "off" respectively.

We refer to all these ones and zeros as *bits*, which comes from the term *b*inary dig*its*. If we were to construct a physical model of what the electronic insides of the Apple look like, we might represent all processed information as hundreds of thousands of ones and zeros.

Bits are the smallest pieces of information the computer understands, just as letters of an alphabet are the smallest piece of information humans understand when dealing with written material. If you can picture someone speaking or writing to you one letter at a time, you have a general idea how computers communicate over the phone lines—one bit at a time.

It's as if we talked to one another by uttering each letter of each word we wanted to say. Greeting your neighbor, "Hello, Mr. Flintstone," would be pronounced, "Aitch ee el el oh comma em i es tee ee ar eff el i en tee ess tee oh en ee." Clearly, it's a much slower process than if we communicated a whole word at a time.

The Apple usually handles information much faster than this. Its microprocessor, the 6502, is an eight-bit processor, which means it handles bits in groups of eight. One or two bits doesn't make much sense to the computer, so it grabs them eight at a time, just as we read words in their entirety. It's only when the Apple has to communicate with another computer via a modem that it deals with information one bit at a time. Communicating over the phone lines, or even through cables to another terminal in the same room, is an example of this.

And the computer handles bits as electrical switches. When a switch is on, it carries a certain voltage; when it's off, it carries a different voltage. In order for computers to communicate with each other, they

have to be connected by a physical device such as a cable. We now have two options; either we set up a network of lines to and from every computer we want to communicate with, or we use some that already exist, like telephone wires.

It's easier to do it by telephone, but it's not always efficient. For instance, banks, which are constantly sending and receiving data among branches, need a line that they can have access to immediately. If they had to dial the telephone each time they wanted to conduct a transaction, the cost of placing all those calls would far exceed the cost of setting up their own lines.

A Modem Is What a Modem Does. In order for computers to communicate, they need some way of transforming their electrical information (bits) into audio signals that can be sent through the phone lines. That's where a modem comes in. *Modem* gets its name from the combination of the words *mo*dulator and *dem*odulator.

When data is going from the computer to the phone lines, it needs to be changed into some kind of sound. The modem modulates electrical data into audio data, or sound. It's sort of like changing written words into Morse code; the person transmitting the code modulates the letters he sees into a series of dots and dashes that are sent to the receiver. The human plays the same part in this example as the modem in computer communications.

The sound patterns that represent all those bits of information are then sent zipping through the phone lines to their destination, whether it's next door or across the globe. When it finally gets there, it has to undergo the reverse process. The modem at the receiving end demodulates the signal from sound patterns back to electrical data the receiving computer can understand. Again, this process is similar to the person receiving Morse code; he changes the dots and dashes he hears into letters that become words on a page.

To sum up all this talk of modulation/demodulation, the modem is really just a translator. The actual information, electrical or audio, stays the same; it's just expressed in a different way.

So that's what a modem is, a device that encodes and decodes information. Computer illiterates needn't feel ashamed to think of it as a thingamajig that does whatchamacallit to the computer junk.

The Real Reasons We Have Modems. Folklore has it that the first modem was invented by a computer nut named Dennis, who was just trying to see if this whole telecommunications thing was possible. He built a modem for his computer, but couldn't tell if it worked or not because he had only one. Two days later, he built a second modem and gave it to his friend, Marvin. Dennis still couldn't tell if modems worked because Marvin didn't have a computer; so Dennis got Marvin a computer.

As soon as Marvin learned how to use the computer, he and Dennis put their modems to work. Dennis phoned Marvin, and they "talked" to each other by typing at the keyboard. The problem was that, programmers that they were, neither Dennis nor Marvin could type very well or very quickly. It would have been much more efficient if they just picked up the phones and talked to each other in the normal fashion.

After a while, our heroes wanted to be able to exchange with each other the programs they had written. To make this possible, Dennis wrote something called a *terminal program*. Marvin went out and bought flowers because he thought it meant Dennis was ill and that this would be his last program ever. Dennis sent the flowers back and explained that a terminal program is a piece of software that instructs the computer to send or receive data, store information that's received, and perform all sorts of nifty functions.

The specific function Dennis had in mind was the transfer of actual programs, rather than text data, which is about all they could transfer up to that point. He gave a copy of the program to Marvin and they were all set. Unfortunately, as with most software, the documentation was poorly written, and Marvin couldn't make heads nor tails out of it. Not even Dennis could understand it, even though he wrote it; he thought software documentation was *supposed* to be confusing.

In the end, they spent much more time trying to transfer their programs via modem than it would have taken for one person to drive to the other's house and simply hand him the disk. But they persisted nonetheless, getting more frustrated each time and racking up phone bills like crazy.

Why We Bother. Let's take a look at what we've learned from Dennis and Marvin. First, communication such as a straight conversation is more efficient if we just pick up the phone and use our voices. Second, it's usually more economical to deliver personally or mail a disk with a file on it than to try to send it by modem, especially if the receiver is a long-distance call away. The postage needed to mail a single disk is about thirty-seven cents.

Given those two points, why do we insist on using modems? Why do we choose to take the cumbersome, more expensive, and more time-consuming way to do things? Because it's fun.

There's really no way to explain fully what is meant by fun; it just feels like it's fun. You get the feeling that you're not alone sitting there at your terminal. There's somebody else out there, somewhere.

And because the computer is such a different medium of communication, the content of the communication is also different. If you've ever watched someone chat with someone else by modem, you'll notice that the participants say things that they normally wouldn't say if they were talking face to face or on the phone. Not only that, but they say things differently. Part of this has to do with the fact that no one has to look anyone in the eye. Pleasantries can be expressed more pleasantly; anger can be expressed more honestly.

Much the same can be said about transferring programs and other files by modem from one disk to another. Unless you're so familiar with a terminal program that you can almost use it blindfolded, transferring files by modem is a bit awkward and not as easy as doing so by other means. The problem here is not with modems, but with the terminal program software.

The field of computer telecommunications today is much like the field of computers was a few years ago—young and growing. As more people begin sinking their teeth (and money) into modems, the problems and inconveniences we experience today will be corrected. More services will become available, modems and software will become easier to use, and we'll all be enjoying the activity more.

This column is where we'll find out about many of the changes that will be taking place in telecommunications and learn more about how to make the most of Dennis's invention.

It should be informative, and it should be fun.

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Softerm file transfer utilizes an easy to use *command language* which may be executed interactively or from a *macro* command file which has been previously entered and saved on disk. Twenty-three high-level commands include *DIAL, CATALOG, SEND, RECEIVE, ONERR, MONITOR, HANGUP,* and others. A *SCHEDULE* command even allows file transfers at a specific date and time.

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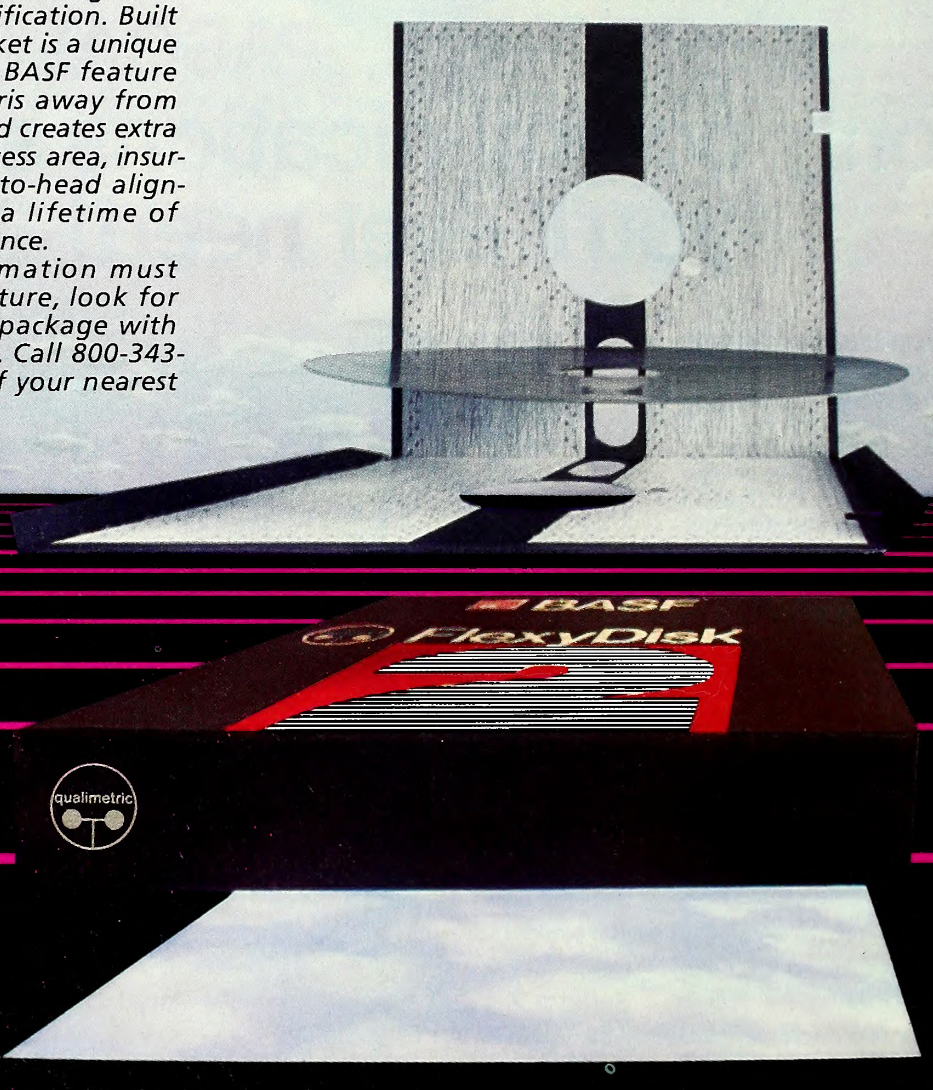

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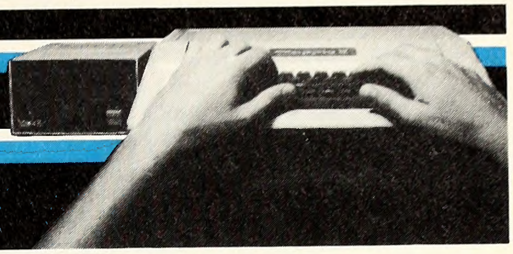


Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

☐ **Apple Computer** (20525 Mariani Avenue, Cupertino, CA 95014; 408-996-1010) has introduced a multicolor plotter that produces graphs and charts on either paper or overhead transparencies. The Apple Color Plotter Model 410 features four color pens that can be interchanged automatically during its operation. Commands to change pens are sent through software. The plotter uses an RS-232C serial interface and will connect directly to the Apple III's built-in serial port. Apple's Super Serial Interface Card connects the plotter to all versions of the Apple II. $995.

☐ **R.R. Software** (Box 1512, Madison, WI 53701; 608-244-6436) has released *Pastran*, a Pascal to Ada translator. The program takes existing Pascal programs and mechanically translates them into Ada. Requires CP/M. $75.

☐ **Don't Ask Software** (2265 Westwood Boulevard, Suite B-150, Los Angeles, CA 90064; 213-477-4514) now has some additions to its software speech synthesizer, the *Software Automatic Mouth* (*S.A.M.*). Now the user can create different voices with *S.A.M.* by using two software controls that adjust the shape of *S.A.M.*'s mouth and throat. Variable settings can make the synthesizer sound like a child, an old woman, a robot, or even an alien. $124.95.

☐ **Harvest Computer Systems** (102 South Harrison Street, Alexandria, IN 46001; 317-724-9527) has begun shipping its *Decision* series of programs, which use "what if" features to give farmers immediate analysis of any changes that occur when variables change. Reporting options of the *Decision* series include profit statements, cost/profit tables, and "what if" analysis reports. The first program, *Feeder Cattle*, gives you the facts you need for making profitable feeder cattle purchases. It can be used for any type of feeder cattle purchase, regardless of weights or feeding program. Several different price and cost levels can be evaluated at the same time. $80. *Land Lease* evaluates both the tenant's and landlord's side of the picture for several types of leases. Lease options include crop share, fixed cash rent, custom incentive leasing, and variable cash rents. $80. For the Apple III, Harvest Computer has released its *Farm Ledger* farm accounting program. This is a translation and enhancement of the *Farm Ledger* program that's currently available for the II. The program offers check writing, checkbook reconciliation, and a flexible enterprise analysis. Entries can be categorized into twenty income and forty expense categories, with up to six subcategories each. Open accounts, notes, or investments can be monitored. $250.

☐ **Howard W. Sams** (4300 West Sixty-second Street, Indianapolis, IN 46268; 317-298-5400) offers a second edition of *Applesoft Language*. The book guides you through the syntax and programming of Applesoft in a nontechnical way. New material in this edition includes coverage of disk operations and an expanded number of examples, charts, tables, vocabulary, and more. $13.95.

☐ **Hutch Computer Industries** (Highway 7 West, Hutchinson, MN 55350; 612-587-2940) produces software for agriculture business people. Under the name of *Compulize* software, the available programs cover farm accounting, crop history, beef feeder projection, hog-farrowing projection, ration balancing, equipment analysis, and other areas. *Mix and Formulation* batches, prices, formulates, and inventories fertilizer and chemical mixes. It prints the batching ticket and invoice and creates reports on inventories of all products. Requires a printer and two disk drives or hard disk. $1,750.

☐ The latest educational game from **Computer Advanced Ideas** (1442A Walnut Street, Suite 341, Berkeley, CA 94709; 415-526-9100) is *Master Match*. This game helps children learn to associate pictures, words, and phrases and offers dozens of interesting and motivational subject areas. It also features a system that lets you create lessons on any subject, using words or pictures, tailoring the program to different needs. $39.95.

☐ **Interactive Microware** (Box 771, State College, PA 16801; 814-238-8294) has added three enhancements to its *Scientific Plotter* program that will link the program to the Hewlett-Packard 7470A and Houston Instrument DMP series color plotters, as well as to *VisiCalc*. New capabilities in the new version of the program include an improved labeling routine for labeling graphs on the Apple's hi-res screen using upper- and lower-case characters as well as many plotting and mathematical symbols. The three *Scientific Plotter* enhancements may be purchased for $25 each.

☐ *Winchester Disks in Microcomputers* takes a look at the disk memory industry and assesses current and likely future trends in disk manufacture. The book, published by **Elsevier International Bulletins** (52 Vanderbilt Avenue, New York, NY 10017), addresses technical and marketing executives, systems designers, and business people using or planning to install microcomputers and office automation systems. $95.

☐ *Postage Saver* is a software package designed to help you save money on bulk mailings. It can handle a list of more than thirty thousand names and will sort thirty disks together with 1,088 names each. The program tells you how many of each zip code you have as it prints mailing labels. *Postage Saver* is written completely in machine language for fast sorting. From **Bullseye Software** (Drawer 7900, Incline Village, NV 89450; 702-831-2523). $99.95.

☐ *Artist Designer II* and *Music Designer II* from **Caps Software** (4024 Alto Street, Oceanside, CA 92056; 619-724-0492) can be used independently or together. Each program has a built-in software interface to allow communication with each other on separate computers. An art performance played by *Artist Designer II* on one computer can be accompanied by a music performance played by *Music Designer II* on another. $49.95 each.

☐ **Computers in Art and Design, Research, and Education** (CADRE) (San Jose State University, Washington Square, San Jose, CA 95192; 408-277-2555) has announced that the CADRE '84 Conference will be held during the week of January 8–14, 1984, at Mission College in Santa Clara, California. The schedule of exhibits and performances includes computer-generated music, computer-generated and computer-assisted video art, a dance performance to electronic music, robots, and much more.

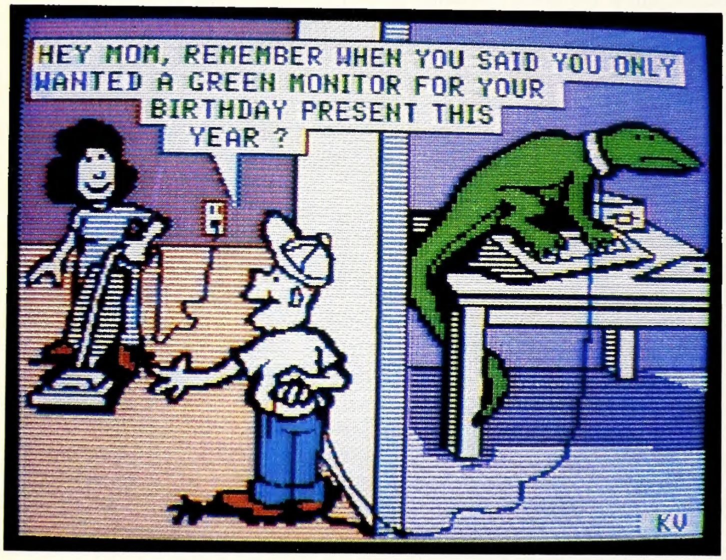
☐ **Micro Format** (1271 Dundee Road, Suite 16A, Buffalo Grove, IL 60090; 312-537-2426) has announced its continuous-form kits. Kit MF201 includes one thousand each of pink, blue, yellow, and white mailing labels. $25. Kit MF207 contains four varieties of colored continuous index cards. You get five hundred each of yellow, blue, green, and red five-by-three-inch cards. $30. Kit MF205 contains five hundred sheets of white continuous letterhead with clean-edge perforations and two hundred continuous envelopes. $25. Kit MF209 provides you with five hundred each of yellow, blue, green, and red six-by-four-inch cards. $49.50. Kit MF211 contains five-by-three-inch Rolodex cards. You get five hundred each in blue, red, and green. $39.50.

☐ Poor Arnold Strump needs your help. In *Trompers*, his job is to catch all the Trompers that are jumping to Earth from their hovering spaceship. The game is from **Avant-Garde** (Box 30160, Eugene, OR 97403; 503-345-3043). Arnold, you see, is a dogcatcher whose shortwave radio hobby got away from him. His signals beamed into outer space were picked up by the Trompers, who, in search of a good time, decided to come to Earth and take over a city near you. $29.95.

☐ Drastic price reductions by **Silicon Valley Systems** (1625 El Camino Real, Suite 4, Belmont, CA 94002; 415-593-4344). The price on *Word Handler II*, formerly $199, has been slashed nearly 70 percent to $59.95. The price on *List Handler* has been reduced from $89.95 to $49.95. Silicon Valley Systems offers both software programs in a package deal called *The Handlers*, which sells for $89.95.

☐ If you're interested in programming your Apple to help you beat the odds when betting, check out **Gambler's Book Club** (630 South Eleventh Street, Las Vegas, NV 89101; 702-382-7555, 800-634-6243). As a source of raw data for the purposes of testing a betting program or trying to gain the edge as a sports bettor, GBC has a large selection of publications available, some of which are applicable to Apples.

☐ *Microcom Networking Protocol* (*MNP*) from **Microcom** (1440A Providence Highway, Norwood, MA 02062; 617-762-9310) is a data communications protocol that permits file transfer to and from a variety of microcomputers over the telephone lines. The protocol accommodates real-time interactive communications and provides a standard file transfer protocol. Microcom says that *MNP* can be used on any existing microcomputer system and is flexible enough to take advantage of the higher performance capabilities of new machines and future designs. The protocol is independent of any microprocessor and operating system; thus, dissimilar systems can exchange files using a virtual file format. The use of *MNP* is available for a one-time $2,500 licensing fee.



Cartoon by Robert Cavey

☐ Two programs are available from **The Professor** (Box 301, Swanton, VT 05488; 514-747-9230). *The Great Creator* lets you create multiple-choice questionnaires in English, as well as in sixteen other languages. With the program's character sets, placing accented letters into text is as simple as typing upper-case letters. *The Great Creator* includes a word processor text entry system, automatic word wraparound, screen instructions in any of the seventeen languages, printouts of questionnaires in various formats, and a scoring system that keeps track of each responder's progress and offers detailed results to the supervisor. $399.95. *Type-Writer* turns your Apple into a multilingual word processor, allowing you to create, modify, and print text in English, Hungarian, Hawaiian, and in most western European languages. The program has several standard word processing functions: insertion and deletion of characters, words, lines, and paragraphs; search and replace; upper- and lower-case display without additional hardware; and text formatting. $69.95.

☐ The *AgDisk Crop Record Keeping Package* from **Harris Technical Systems** (624 Peach Street, Box 80837, Lincoln, NE 68501; 402-476-2811) keeps crop and field records in working order. Years of crop and field data can be recorded, retrieved, and analyzed more easily and with less paper shuffling. Summary reports that include graphs and text printouts can be prepared easily. Subject areas are provided for records on major field operations such as plowing, planting and harvesting, plant population, row spacing, fertilizer applications and costs, weather information, and many others. $600.

☐ *The Computer Dictionary* is a reference book with clear definitions of current computer terminology. Published by **Running Press Book Publishers** (125 South Twenty-second Street, Philadelphia, PA 19103; 215-567-5080), the book includes basic computer terms and newly coined ones. $4.95.

☐ The Half Track disk drive is a 5¼-inch floppy drive that stands half as high as an Apple drive, provides 160K of dual density storage, and is fully compatible with any Apple running DOS 3.2 or 3.3. Manufactured by **Wholesale Technology** (1530 South Sinclair, Anaheim, CA 92806; 714-978-9820), the disk drive comes with Central Point Software's *Filer* utility program for DOS 3.3, a controller card and cable, and documentation. $399.95.

☐ **Sterling Swift Publishing** (7901 South I-35, Austin, TX 78744; 512-282-6840) has released *40 Easy Steps to Programming in Basic and Logo*. The book is written for the beginning computer programmer. It provides instruction on the two popular beginner languages, Basic and Logo. The instructional presentation uses a learn-by-doing approach. Easy-to-follow steps take the reader through the simplest of procedures. $3.95.

☐ **Microphys Programs** (1737 West Second Street, Brooklyn, NY 11223; 212-375-5151) comes to the aid of college-bound students. Its *SAT Software Package* is designed to help students deal with vocabulary, analogies, and mathematical problems generally found in standardized college entrance and achievement exams. $200.

☐ **BV Engineering** (Box 3351, Riverside, CA 92519; 714-781-0252) has begun marketing *ACNAP* (*AC Network Analysis Program*). It's a general-purpose electronic circuit analysis program that analyzes circuits consisting of resistors, capacitors, inductors, a voltage source, and controlled current sources. *ACNAP* will analyze the response of any linear network consisting of up to twenty-one nodes and sixty components. Every command is either menu-driven or program-prompted. Circuit data can be saved to or retrieved from disk. Requires CP/M. $39.95.

☐ Attention, school administrators: *Locks and Lockers* is a program for efficient record keeping and information retrieval concerning locks, lockers, and lock combinations commonly used in school physical education or science lab settings. The program makes it easy to enter and retrieve data for up to sixteen hundred students on a single disk. Teachers record the students' names, locker and lock numbers, and lock combinations as assignments are being made; they can cross-reference all information at any time. From **Persimmon Software** (502C Savannah Street, Greensboro, NC 27406; 919-275-5824). $35.

☐ Fire fighters: *The Fire Reporter* gives fire officers important information about a fire call while fire companies are en route to the scene. Designed by **Software Lab East** (121 Gordon Street, Ridgefield Park, NJ 07660; 201-440-9593) for local fire departments, the program provides information such as the nearest major cross street, nearest hydrant, type of structure on fire, hazardous materials contained in the structure, number of children, the total number of persons inside (including invalids and the elderly), and more. All the fire officer has to do is type the address of the structure. $125.

☐ **Microformat** (1271 West Dundee, Buffalo Grove, IL 60090; 312-537-2426) manufactures continuous envelopes that can be used with any printer that accepts twelve-inch forms. They're available in quantities of two hundred for $16; quantities of five hundred for $42.50.

☐ **Vytron** (Box 7019, Alhambra, CA 91802; 213-289-8936) makes the Logic Switch, a software-controllable video switch that eliminates the hassle of plugging and unplugging cables when switching from the Apple's normal output to that of an eighty-column display. The switch plugs into the game I/O port without obstructing the use of the port. It also includes a trimmer to set the output level from the eighty-column display, eliminating the need to adjust the brightness when switching between forty- and eighty-column output. The switch uses a single command from the keyboard in Basic, Pascal, or assembly language. $23.95.

☐ **FineTech Furniture** (Box 280, Woodbury, TN 37190; 615-765-5021) has introduced a line of furniture for microcomputers. The Woodbury series features handcrafted pieces of solid oak in traditional or contemporary styling. The line features individual components that are sold separately or as a complete set. Components include a desk, printer stand, shelves, keyboard drawer, and monitor platform. Complete set, $1,000.

☐ **Microtech** (Box 5756, 200 North Sixty-sixth Street, Lincoln, NE 68505; 402-467-5521) markets *Pro-Fin*, a financial reporting, planning,

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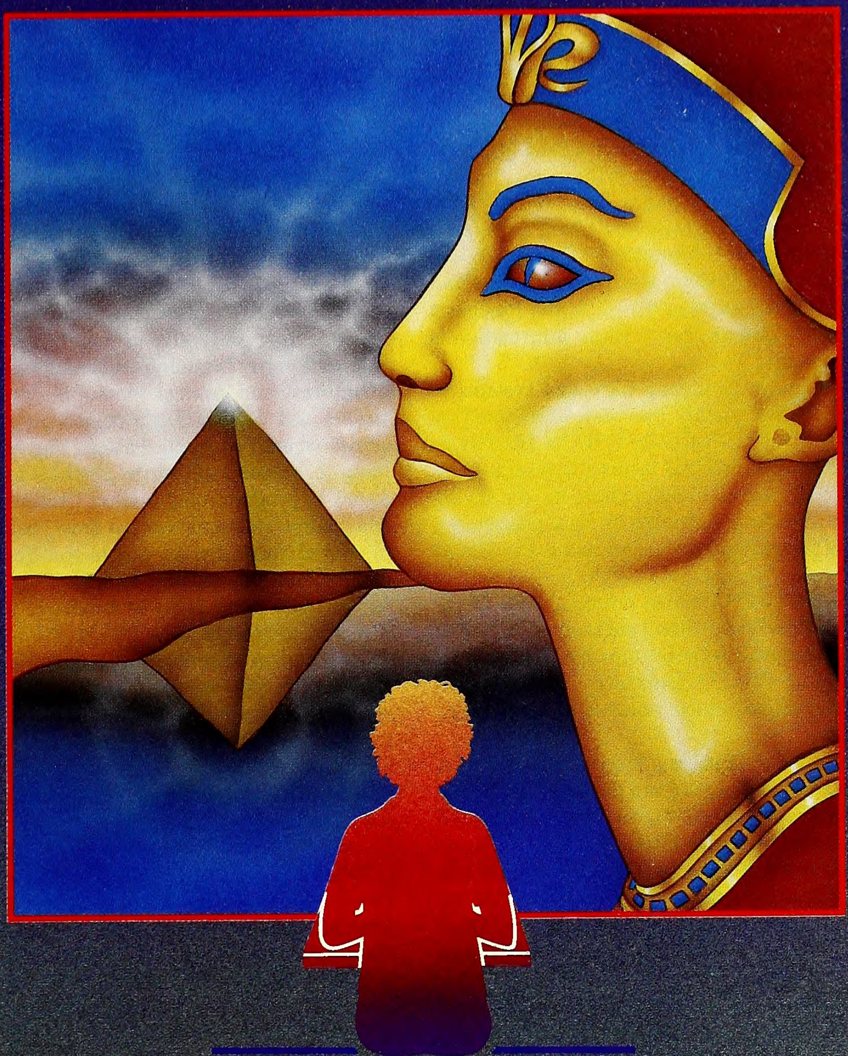

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"Unless there is one among you with the cunning, wit, strength and valor to reach me in my chambers in the heart of my pyramid. Just one.

"Ha! I amuse myself with the thought. To imagine a mindless man being stung by my winged serpents and pet spiders...crashing through the dozens of trap doors...fighting off the spirits of my palace guard! And to see what happens when he tries to use his conventional weapons in the magnetic maze of my sarcophagus!

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and control system that has modeling, budgeting, projection and balancing routines, and "what if" capabilities. *Pro-Fin* accommodates up to twenty-four periods of historical data in projecting twelve future periods. Projections are done for each account, using projection methods selected by you. Once each account is projected, the program balances the projections. Requires two disk drives. $1,000.

□ **American Training International** (3770 Highland Avenue, Suite 201, Manhattan Beach, CA 90266; 213-546-4725) has released training software for *dBase II* and *BPI General Accounting*. The training packages use interactive disks that simulate the software and lead the user one step at a time through the use of the software. Both require CP/M. *dBase II* training, $39.95; *BPI General Accounting* training, $75.

□ **Learning at Pinehurst** (Box 2328, Chapel Hill, NC 27514; 919-967-6996) believes that educational seminars don't have to be conducted in dull surroundings. The company's conducting "Introduction to Computers and Their Applications," a brief course for executives and professionals. The course will be held October 19–21 at the Pinehurst Hotel and Country Club, a golf and tennis resort. More information is available from Learning at Pinehurst.

□ A manual that provides techniques, command files, and systems to run *dBase II* software effectively and quickly has been introduced by **Compudex** (Box 147-S, Natick, MA 01760; 617-235-5152). *The Beginning and Advanced dBase II Techniques Manual* features complete command files, a journal entry system, instructional techniques for saving space on your disk and in your directory, speeding up data processing, using ASCII characters, reporting effectively, and using the CP/M editor. $25.

□ **Personal Computer Products** (1400 Coleman Avenue, Suite C-18, Santa Clara, CA 95050; 408-988-0164) has released an RS-232 analyzer, a product that makes it easy to diagnose, monitor, and connect any device or computer using an RS-232 interface. The analyzer monitors nine RS-232 signals and displays their status in bicolor LEDs. $149.95.

□ **Com-Co Communications** (900 Madison Street, Seattle, WA 98104; 206-622-6430) markets *MailCom*, a program that lets your Apple use E-Com, the United States Postal Service's own electronic mail system. Your letters must be created on *Apple Writer 1*. *MailCom* reads the addresses written through its mailing list program and the letter you write. The information you select is formatted and then transmitted via modem to one of twenty-five E-Com centers across the nation. Once received, the post office prints and delivers the letters for you. Requires a Hayes Micromodem II and *Apple Writer 1.1* or *1.0*. $225.

□ There are two new packages from **Proflo Software** (Box 7115, Murray, UT 84107; 801-266-5368). *Compiled Customer/Client Processor* is a program designed to provide storage and manipulation of important information concerning firms and people with whom you do business. There are fourteen information fields, five of which are defined by the user. The program can search for records, using up to five different user-specified criteria. The system also prints records, mailing labels, and telephone directories for up to three hundred records per disk. $59.95. *The Last Diary* is a record-keeping system similar to the traditional book form. The program maintains one page for each day of the year. The search features let you find specific data quickly and send the results to the screen or to the printer. $49.95.

□ This is no joke. **MicroTie Systems** (Box 8112, Walnut Creek, CA 94546; 800-227-3900, 800-632-2122) gives you a way to vent frustrations when the computer acts as if it had a mind of its own. The Byte Bat is a seventeen-inch-long foam rubber baseball bat that makes it safe for you to whale and whack away at your computer when glitches, power surges, or any other acts of nature (human or otherwise) destroy your data. The bat features a number of digital interface modes, plus BAUD (basic aggression units of dissatisfaction) rates from one to more than twelve million. The device is compatible with all computers and operating systems. $9.50.

□ **The Interface Group** (300 First Avenue, Needham, MA 02194; 617-449-6600, 800-325-3330) has announced several Computer Showcase Expo shows. All shows are aimed at business, professional, and corporate users of small computer and word processing systems. Shows will be held in the following cities: Pittsburgh, at the Lawrence Convention Center, October 20–23; Philadelphia, at the Civic Center, October 6–9; Miami, at the Miami Expo Center, October 27–30; Denver, at Currigan Hall, November 3–6; Los Angeles, at the Los Angeles Convention Center, November 10–13; Washington, D.C., at the DC Convention Center, November 17–20; Chicago, at McCormick Place, November 17–20. Admission is $7.50 for all shows. Discount tickets available from participating computer retailers will get you in the gate for $5.

□ **Program Design** (95 East Putnam Avenue, Greenwich, CT 06830; 203-661-8799) has completed a study to determine the effects of computerized teaching aids on preschool children for developing reading and other learning skills. The study showed that by using electronic teaching tools preschoolers can increase their learning skills at a much earlier age than had been thought previously. The contention is that computers can be an invaluable aid to parents acting as teachers in the home. Copies of *PDI Study on Computers with Preschool Children* are free. Send a self-addressed envelope and 75 cents to cover mailing.

□ **Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 201-368-2202) publishes *Getting the Most from Your Micro: A Guide to Maintaining and Supertuning Your Computer System*, a hands-on guide to conducting preventive care and remedial maintenance procedures. An extensive buyer's guide is included to enable readers to locate products of interest and contact the suppliers. $14.95. *Pascal Programs for Games and Graphics* is a collection of twenty-two arcade-style video games written in Apple Pascal. The book uses sophisticated programming techniques and turtle graphics to create graphics utilities seldom found in programming books. Utilities include programs to create and edit custom character sets, to draw, paint, and save full-screen graphics, to correct small details, and to transfer creations from screen to paper, using almost any printer. $15.95.

□ The first in the *Tales of Adventure* series from **Infocom** (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031) is *Infidel*, a contemporary action adventure that introduces a new genre of adventures. Michael Berlyn's second adventure takes you to the vast Egyptian desert, where you're challenged to find the buried entrance to the last great pyramid and seize priceless treasures that have been hidden for years. This game offers a journey into the chronicles of history; assisting in the project was a Harvard graduate student involved in extensive research on the pyramids. $49.95.

□ Are you computer-literate? **Computer Literacy Training Systems** (12900 Preston Road, Suite 500, Dallas, TX 75230; 214-233-7638) offers a series of video tapes designed to introduce teachers, students, parents, and business personnel to the basic operations of computers and their components. Twenty-minute tapes are available on topics of keyboard and monitors, memory storage devices, printers, and modems. Personal computer tapes are available specifically for the Apple IIe also. Software video tapes include introductions to *VisiCalc*, *PFS*, and *Apple Writer*. User guides accompany each tape. From $125 to $200.

□ The *bitCard* is a customized software gift for computer owners. Designed as graphics adventures, the themes of which relate to a specific holiday or event, the *bitCard* can be ordered custom-programmed so that each one is unique. A person who receives a *bitCard* as a gift will find several references to himself as he proceeds through the adventure, as in those storybooks for kids in which they are the central characters. It can also be programmed to deliver a personal holiday greeting in whatever words the sender wishes. Available from **bitCards** (120 South University Drive, Suite F, Plantation, FL 33317; 305-473-4741). $16.95.

□ *Ag Count*, a farm accounting program from **Ag Plus Software** (906 South Main, Ida Grove, IA 51445; 712-364-2135), is now available on demo disks. The demo pack includes a manual and four disks. The $45 cost of the demo disks can be applied to the cost of $600 when the entire program is purchased. For more information, contact Ag Plus.

□ If the *WordStar* manual seems like it's written in a foreign language, then *WordStar in Everyday English* might be worth looking at. Published by **Devin-Adair** (143 Sound Beach Avenue, Old Greenwich, CT 06870; 203-637-4531), the book is broken down by job rather than computer function. There are no practice letters or exercises; all practice is done on the job at hand. $9.95.

□ **Professional Publications** (Box 199, San Carlos, CA 94070; 415-593-9119) manufactures disks with jackets in five brilliant colors; fire engine red, canary yellow, bright orange, sky blue, and leprechaun green. Five pastel colors are also available. All disks are double density and carry a lifetime replacement policy. $26.90 to $40.35 per pack of ten.

□ **SKU** (2600 Tenth Street, Berkeley, CA 94710; 415-848-0802)

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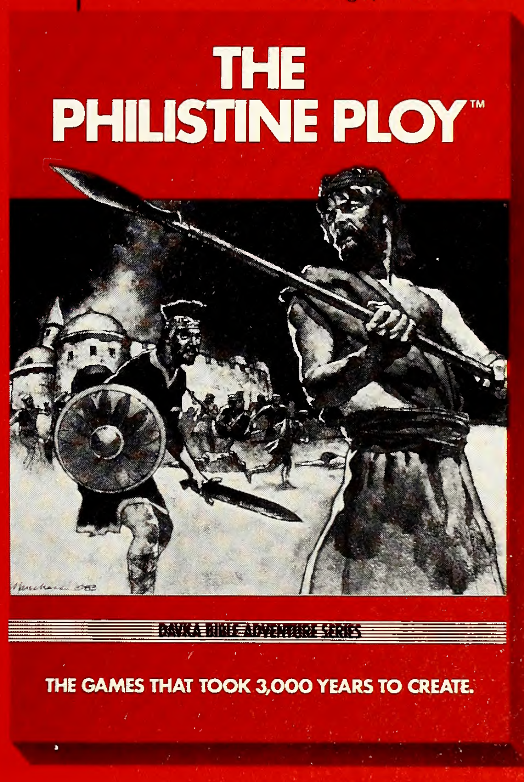

DAVKA ADVENTURE GAMES. . . WE TOOK OUR TIME.

publishes *Software Express*, a three-hundred-page guide that describes more than eight hundred of today's popular software programs for microcomputers. Each program is classified by subject, and information about each program includes the program's manufacturer, amount of memory required, accessories and peripherals that are optional or required, the type of controller needed, suggested age range and skill level, and format. $14.95.

☐ A report generator for *The Incredible Jack* has been introduced by **Business Solutions** (60 East Main Street, Kings Park, NY 11754; 516-269-1120). The package is called *Jackreport* and uses information from any *Jack* file to create customized reports. *Jackreport* provides reports in a tabular form up to thirty-six columns wide. It can count the number of entries in a column, calculate a total, or average the column. Subtotals, subaverages, and subcounts can be reported by field changes. Printing features include page headings, column titles, screen previews, pagination, and variable paper sizes. $99.

☐ Touch-N-Know is a touch-sensitive training system for computer-aided instruction from **Educational Dimensions Training** (Box 126, Stamford, CT 06904; 203-327-4612). The system consists of a color monitor with thirty-two programmable touch-sensitive areas on the screen. An interface card and two-disk editing program completes the package. The editing system lets the trainer write menus from which other menus or text display screens can be chosen. Graphics can be added wherever they're needed. $3,250.

☐ **Advanced Digital Information** (723 Ninth Avenue, Building A, Kirkland, WA 98033; 206-822-5579) manufactures a large-capacity cartridge tape system called the Data Library. It has a removable cartridge that's block-addressable. Each cartridge is preformatted to allow random access. Software is included to organize files under DOS 3.3 in the same manner as a hard disk. A formatted cartridge contains one hundred seventy volumes with forty-eight tracks; each track has thirty-two sectors. The interface card has a RAM buffer for instant directory and file access; the buffer can be expanded from 64K to 1 megabyte. $2,900 to $4,900.

☐ **Enhanced Software Products** (Box 178, Wantagh, NY 11793; 516-799-2679) has introduced *Color Printer*, a program that lets you produce full-color printouts on an Epson MX-80 printer with Graftrax. Using color separation and fast screen dump routines, the program strips out and prints each hi-res color. Included is an option that enhances color saturation by compensating for the way the Apple displays color on alternate screen dots. No hardware or software modifications or special interfaces are necessary. The package comes with four colored Epson ribbon cartridges. $69.95.

☐ **The Small Computer Company** (230 West Forty-first Street, Suite 1200, New York, NY 10036; 212-398-9290) has converted its TRS-80 database program, *Profile*, to run on the Apple as *filePro*. The program uses menus and prompts for all functions; files can be organized alphabetically, numerically, or by date; up to ten reports and ten labels or mailing lists can be created and printed for each file. *filePro* accepts up to 69,535 records per file, ninety-nine fields, and more than one thousand characters per record. Requires CP/M. $300.

☐ A series of book/disk tutorials on *Multiplan, WordStar*, and *VisiCalc* are available from **Computer Tutor** (554 Washington Street, Wellesley, MA 02181; 617-237-6061). The self-pacing guides present one concept per page and include graphics as visual aids. $39.95 each.

☐ **Expositions** (33 Bell Street, West Babylon, NY 11704; 516-293-5533, 212-443-2000, 201-675-1778) is the producer of Consumer Electronics and Computer Expo, which will be held February 9-12 in Long Island, New York, at Colonie Hill's Empire State Ballroom. Nearly two hundred companies will be displaying and selling products, from personal computers and software to satellite antennas and compact disc players.

☐ *OpVal* is a stock option analysis program that can evaluate ninety-six options in eighteen seconds. The program's electronic-book displays combine menu-driven operation with the speed and flexibility of spreadsheet software. From **Calcshop** (Box 1231, West Caldwell, NJ 07007; 201-228-9139). $250.

☐ **Pascal & Associates** (135 East Rosemary Street, Chapel Hill, NC 27514; 919-942-1411) has a product for Pascal programmers who wish to develop database management applications. *DBX* stores data strings that are passed to it from another program. *DBX* is modular; you can write a program to call it, or modify *DBX* itself. Included in the package

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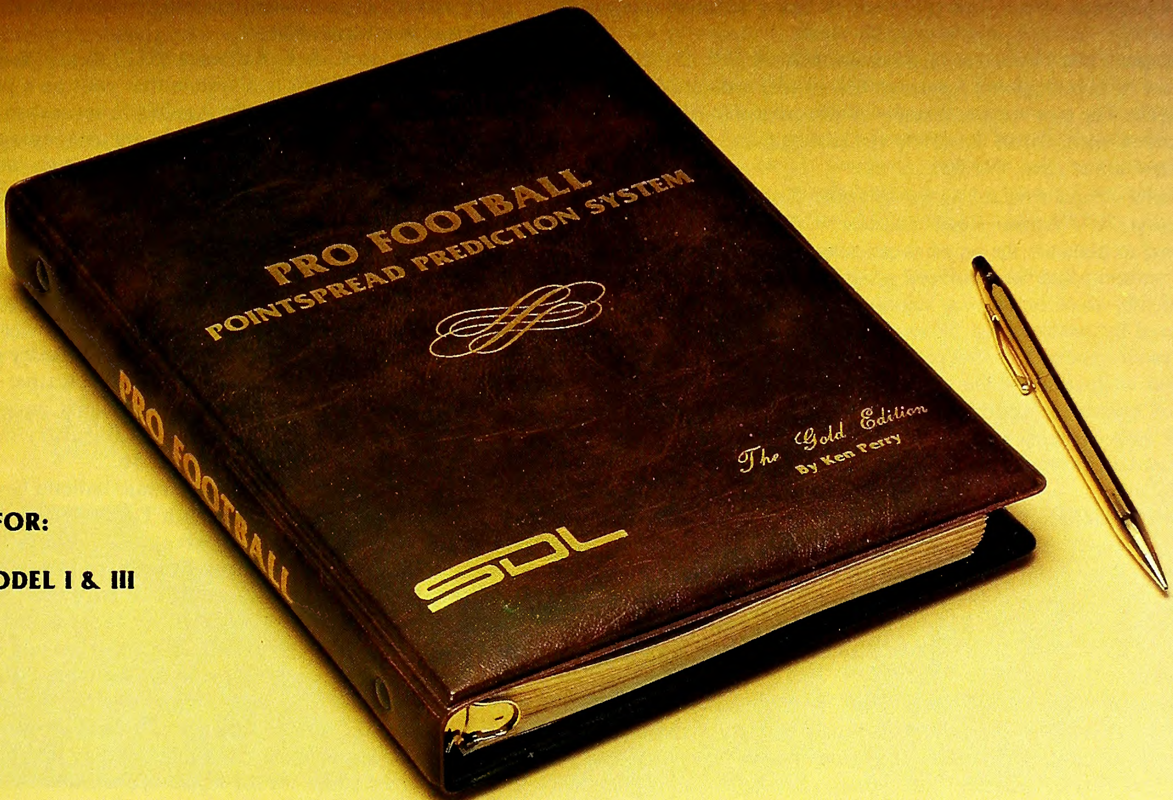

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are the object and source codes for three programs: *DBX*, an example program that calls *DBX*, and a diagnostic text program. $49.95.

☐ **Bytewriter** (125 Northview Road, Ithaca, NY 14850; 607-272-1132) has added two printer/typewriters to its line and is selling interface kits as well. The Olivetti Praxis 35 and Praxis 40 can be used as typewriters or as letter-quality printers for the Apple. For both machines, the computer interface fits completely inside the machine. Praxis 35, $545; Praxis 40, $645. Until now, Bytewriter offered the Praxis 30 and interface as a package. Now, the interface is being offered separately for $165.

☐ **Microsparc** (10 Lewis Street, Lincoln, MA 01773; 617-259-9710) has updated its *GALE* (global Applesoft line editor) software package for the Apple IIe. The new version features cursor control in edit mode using the four arrow keys, use of the delete and tab keys, and two help screens in upper and lower case. $49.95.

☐ *VisiWord—Word Processing for You and Your Business*, published by **VisiCorp** (2895 Zanker Road, San Jose, CA 95134; 408-946-9000), is designed to enhance the word processing skills of professional and business writers using the *VisiWord* program. The book contains a collection of fifty word processing solutions to common writing problems encountered by professional managers, secretaries, and others in the business environment. The first part covers general techniques that apply to business writing tasks; the second part describes and illustrates examples of business functions, such as generating reports and invoices. It also explains how the *VisiWord* program can be used with *VisiFile* and *VisiCalc* to produce reports and business documents. $18.95.

☐ **Lintek** (Box 8056, Grand Rapids, MI 49508; 616-241-4040) makes Monitor Mover, an adjustable mechanical arm that mounts on the desk and holds most microcomputer displays above the user's desk. It consists of a heavy desk clamp, a 360-degree swivel base, a fifteen-inch vertically adjustable arm, and an individual CRT mounting tray that swivels and can be tilted up to 15 degrees. Apple, Amdek, and Zenith are just some of the monitors it works with. $129.95.

☐ The latest in soft wear are two T-shirts from **Sinequanon** (Box 235, Cedarhurst, NY 11516). Both shirts are a pale blue polyester and cotton blend with printing in red ink. One shirt pictures a lo-res apple, with the caption, "My Apple Has Juice"; the other, "My Apple Is Programmed to Byte." $8.

☐ **Computer Application Services** (12535 Seal Beach Boulevard, Suite 210, Seal Beach, CA 90740; 213-493-2411) makes *I.M.I.S.*, an investor's management information system directed toward the professional financial broker/dealer. The system provides portfolio management, mailing-list management, full investor reports, interconnections to external information sources, and word processing. *I.M.I.S.* offers such reports as capital gains and losses schedules, product ledgers, sales information, and maturity and expiration reports. The program consists of more than thirty screens and reports that are selectable through layered menus. $235.

☐ A new medical newsletter, *Physician Computer Monthly*, presents information to doctors who use micros and minicomputers in their practices. This twelve-page periodical covers computer applications for practice management, patient care, continuing medical education, and communications. **Physician Computer Monthly** (67 Peachtree Park Drive, Atlanta, GA 30309; 404-351-4523). $95 per year. Sample issue is free.

☐ The Permanent Random Access Writeable Memory (PRAWM) board is a nonvolatile memory board made by **Advanced Peripheral Enterprises** (2617 S.E. Swain, Milwaukie, OR 97222; 503-654-0611). You can write to the board as if it were RAM, and it holds data as if it were ROM. No battery backup is required, and no EPROM programmer is necessary. Four versions: 2K, $124.95; 4K, $166.95; 6K, $208.95; 8K, $249.95.

☐ In *Geopolitique 1990*, you're the president of the United States, facing an economically troubled world. In phase one of the game, you head the struggle between the United States and the Soviet Union for economic dominance. Political savvy in international haggling will make or break your attempt to gain world dominance without war. Phase two simulates nonnuclear war with air strikes, amphibious landings, air superiority, and terrain negotiation. Seven different scenarios range from a possible present-day situation to hypothetical settings projected in the 1990s. Another from **Strategic Simulations** (883 Stierlin Road, Building A-200, Mountain View, CA 94043; 415-964-1353). $39.95.

☐ **Sunshine Software** (Box 707, Cortland, NY 13045; 607-756-7726) has introduced two products for the educational market. *Quiz Master* allows teachers to create up to ten quizzes and two hundred fifty student records per disk. Quizzes can be printed out or students can take them at the computer. Also featured are modifiable characters, mastery levels, summary reports, and a tutorial disk. $99.95. *Teacher's Helper* consists of two games for classroom instruction: a *Concentration*-type word game and a hangman word guessing game. Either teachers or students can enter word lists. $29.95.

☐ *T & G* from **C & C Software** (5713 Kentford Circle, Wichita, KS 67220; 316-683-6056) is a system that your own programs can use to place text and graphics on the Apple's hi-res screen. Text characters of various sizes can be placed on-screen by using two different commands from Basic. Lower case is available in the two larger character sets; several features, including the ability to print subscripts and superscripts and to overlay text, are provided. *T & G* also has a utility for producing either static or animated graphics. Images can be created and edited through an editor program. $65.

☐ Lost? If a map of the mazes in the *Wizardry* scenarios would help, then contact **Stanley Kasper** (4932 North Ridgeway, Chicago, IL 60625). He's selling maps for all three *Wizardry* scenarios. They're photocopies of hand-drawn maps made by Kasper himself. You'll be able to see one-way and two-way doors, pits, magical items, teleport points, stairs, messages, and more. *Wizardry* map, $5; *Knight of Diamonds*, $5; *Legacy of Llylgamyn*, $6.

☐ *Net-Works II*, the popular electronic bulletin board service, is now being marketed exclusively by **High Technology Software** (Box 60406, 1611 N.W. Twenty-third Street, Oklahoma City, OK 73146; 405-524-4359). Several improvements have been made to the program, including the option to put your BBS on hard disk. $99.

☐ Two new releases are available from **Screenplay** (Box 3558, Chapel Hill, NC 27514; 919-493-8596). *Blackjack* lets you turn your home into a Las Vegas casino, teaching you the techniques that blackjack expert Ken Uston uses. $69.95. In the *Warrior of Ras* series, you enter a world of adventure and peril in which you'll fight ghouls and goblins, dodge traps and hidden dangers, all while building up your skill and wealth. The first in the series for the Apple is *Dunzhin*. Take the treasure at the lowest level of the dungeon before the Wyverns take you. $29.95.

☐ *The Kilobyte Kid's Book of Personal Computers* is an informative, easy-to-read presentation for kids, or even adults, interested in learning about computers in a fun and fast way. The book deals with the fears people often have about computers, the questions of whether computers really think, and how to select a personal computer. From **Wadsworth Electronic Publishing** (8 Davis Drive, Belmont, CA 94002; 415-594-1900). $9.95. Also from Wadsworth is the *Key-by-Key* series of books that let you create a general ledger accounting system with *VisiCalc*. The series is designed as an intermediate step between a manual system and a complete electronic accounting system. Workbooks are written in plain English. Templates taken from the book are available on disk for $29.95 each. Two books in the series that are applicable to the Apple: *General Ledger Accounting System for VisiCalc*, $19.95; *Payroll for VisiCalc*, $19.95.

☐ **Cotec** (13462 Hammons Avenue, Saratoga, CA 95070) has released *RTTY Machine*, a program that transmits and receives Teletype. Audio tones fed into the Apple's cassette input are demodulated and decoded into software and then sent to the screen as text. Keyboard input is encoded to Baudot and sent to the cassette output. $29.95.

☐ **Milwaukee Area Technical College** (1015 North Sixth Street, Milwaukee, WI 53203; 414-278-6743) has developed a computer-aided drafting instructional package for the Apple. *MATC CAD* simulates a selected subset of a high-powered CAD/CAM system. Complete arc, line, and point entity creation is possible, along with linear and angular dimensioning. Screen controls include zooming and paging. Editing features include trim, erase, move, mirror, and rotate. Output can be plotted on a Hewlett-Packard 7470A or a Houston Instrument DMP40 plotter. Requires two disk drives and an Apple Graphics Tablet. $500 for first package; $100 for each additional package.

☐ One of the latest from **Prentice-Hall** (Englewood Cliffs, NJ 07632; 201-592-2158) is *Programming a Personal Computer*, a book that reveals the Edison software system—a system similar to Pascal that can

be adapted to microcomputers. The book explains how the Edison programming language was developed and how it's implemented, including both the operating system and compiler program text. Case studies give examples of systematic programming, data structures, programming languages, computer architectures, compilers, and operating systems. $25.

☐ The Third Annual Computer Electronics Fair will be held at Reno Centennial Coliseum, October 14–16. It's free, and everyone is invited to come and buy things from exhibitors who will be selling products, from computers and software to security equipment and office supplies. There will also be various seminars, classes, and demonstrations. Sponsored by **CBC Presents** (2510 J Street, Sacramento, CA 95816; 916-441-7482).

☐ *Apple II Basic Programs in Minutes* contains more than sixty-five home and business programs. Typical programs in this book from **Sybex** (2344 Sixth Street, Berkeley, CA 94710; 415-848-8233) prepare a mortgage payment schedule, keep personal and automobile records, find the break-even point for a new business, project stock market trends, and much more. No knowledge of Basic programming is required; however, the programs can be customized and expanded by persons familiar with the language. $9.95.

☐ **Computer Tutor Publishing** (925 Demun Avenue, Saint Louis, MO 63105; 314-725-1088) is marketing a series of four videocassettes designed as educational aids to introduce teachers and students to personal computers. The cassettes invite hands-on participation and explain all material in clear, simple language. Videocassettes are available in either VHS or Beta format. *First Byte of the Apple* outlines hardware to show the computer's functions and operational hook-up. DOS commands are introduced. *Basic Programming: Coding, Counting, and Comparing* teaches the fundamentals of Basic. *Graphics: A Picture Is Worth a Thousand Words* introduces and explains lo- and hi-res graphics, peek and poke commands, memory maps, and shape tables. *Problem Solving: Calculating, Formatting, and Filing* teaches how to use math and trigonometric functions, explains strings, and teaches how to handle text files. Also included is an overview of *VisiCalc* and *Apple Writer*. Each videocassette is $135; all four tapes, $499.

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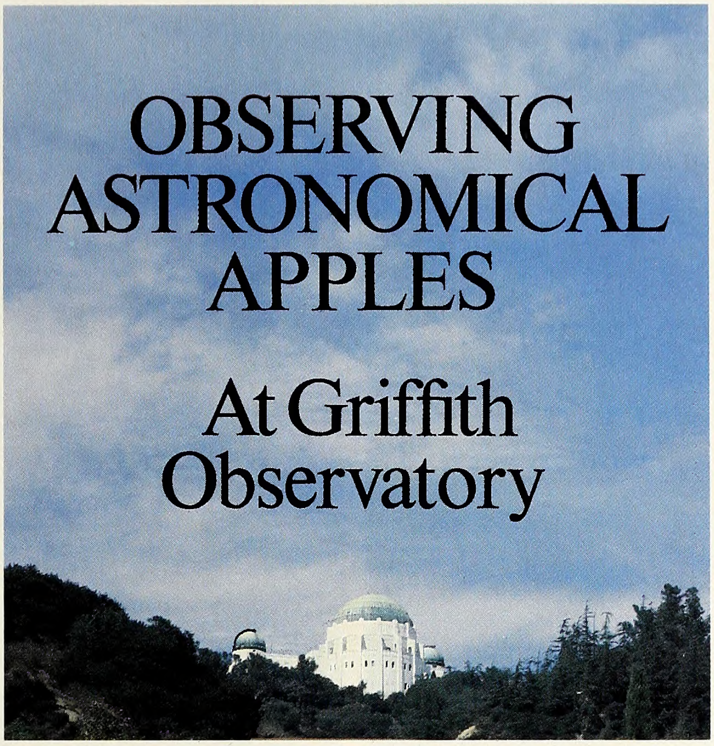
*Software included with Touch Tablet varies with computer type.



OBSERVING ASTRONOMICAL APPLES

At Griffith Observatory

BY HOWARD A. SHORE

Perched on the side of Mount Hollywood overlooking the sprawling, often smog-enshrouded metropolis of Los Angeles, the Griffith Observatory stands like a monument to the aspirations of an earlier generation. Its twelve-inch Zeiss telescope peers watchfully into the night sky, giving visitors from all over the world an opportunity to view for themselves the glittering constellations.

On the north court, an imposing white pyramidal structure heralds the approach to the observatory. This sculptured monument pays tribute to Galileo, Newton, Kepler, Herschel, Hipparchus, and Copernicus, six of mankind's greatest astronomers.

Stairway to the Heavens. Atop a wide granite stairway, massive bronze doors open to reveal a marble-floored rotunda—site of the first of the observatory's many wonders. There, suspended by a single golden strand attached to a frictionless bearing mounted high in the vaulted ceiling above, a forty-foot, two-hundred-and-forty-pound pendulum swings without resistance across a shallow well. Because of the inertia of the heavy metal ball, the Foucault pendulum, as the towering display is called, always maintains a steady course. Yet, if watched closely, the pendulum seems gradually to change its course. This seeming inconsistency is made apparent by an arc of small wooden blocks on the floor of the well that, over the course of the day, are knocked over one by one. This is due not to the gradual change in the direction of the pendulum, but rather to the rotation of the earth beneath it.

On all sides of the rotunda, exhibits and displays help to demonstrate fundamental laws of physics and astronomy by providing illuminating looks at the earth and the universe. The hallways are filled with exhibits—everything from a sample of meteoric rock dating back thou-

Opposite: Observatory director John Mosley poses with the Zeiss planetarium projector silhouetted against a background of stars. "This machine uses technology that was available in the twenties," jokes Mosley. "There's nothing digital about it."

Making education enjoyable is one of the highest priorities of the Griffith Observatory staff. Above: Director John Mosley on the steps leading to the observatory's main entrance. Left: "Look Ma! No tokens." The fruits of Mosley's labor: young minds learning with eager fascination. If the "Astronomical Computer's" keyboard looks familiar, it should. It's an Apple.

sands of years to a modern "multiplexed" hologram of the earth as seen from an orbital weather satellite.

The observatory's six-hundred-seat planetarium—a cosmic theater where heavenly spectacles are re-created and explored—delights and enlightens audiences, in keeping with a tradition steadfastly held since the observatory first opened its doors in 1935.

An institute devoted to public education rather than research, Griffith Observatory has, nonetheless, made contributions to the world of astronomy. Among the most notable of these is astronomer Paul Roques's discovery in October 1961 of a "flare star." A flare star is characterized by short periods of significant increases in brightness, which may last several seconds or several minutes.

Down the west wing of the observatory's museum, past the flashing display of a tesla coil, is a new exhibit—one which, since its opening in January, has typically been surrounded by visitors of all ages. Situated in the center of a stylishly designed display cabinet with the words "Astronomical Computer" embossed on its front is an Apple II Plus. A clear Lucite covering, with an opening to provide access to the keyboard, gives visitors a look at the inner workings of the Astronomical Apple.

The Demonstrative Apple. Donated by the philanthropic community support group Friends of the Observatory (FOTO), the observatory's display Apple was programmed by Peter Scott, a graduate in computer programming at Cambridge University in England.

A former resident of Essex, England, Scott currently works at the Jet Propulsion Laboratory in Pasadena, California. There he is engaged in the programming of navigational maneuvers for the Galileo project, the unmanned Jupiter probe scheduled to launch later this decade.

Scott's interest in astronomy, a love that goes back to childhood, is strongly connected to his work with computers. Although he trained on Cambridge University's IBM 3081, he holds microcomputers in high regard.

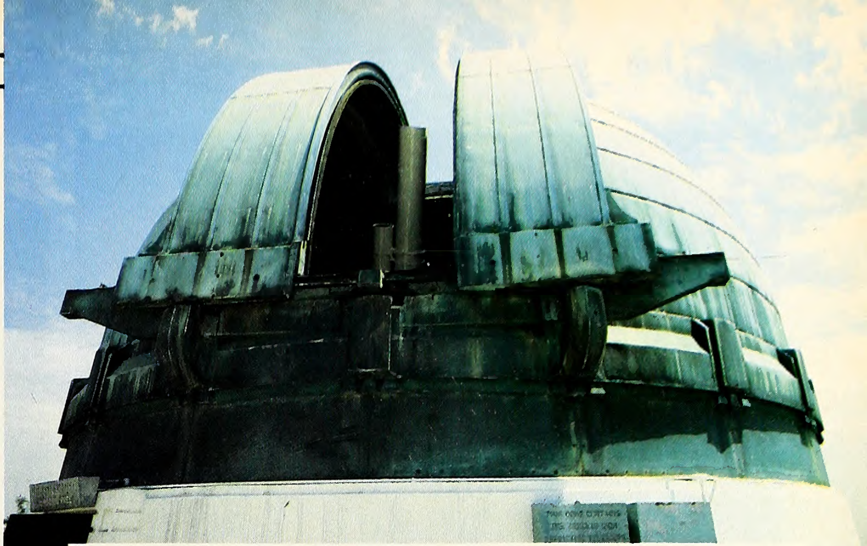
"Their main advantage lies in the fact that they are oriented toward single users," he says. "This enables them to eliminate the vast amount of software and hardware that, on mainframes, is there purely to handle the interaction between multiple users."

Based on data and algorithms provided by John E. Mosley—the person most responsible for the continued development of the observatory's remarkable exhibits—Scott has written three menu-driven Applesoft programs. All were designed with the tradition of the observatory in mind—to teach and enlighten, while remaining entertaining and enjoyable.

Museum patrons have three programs to choose from: *Professor Astro*, *Hangman*, and *Birthdates*.

Professor Astro is a quiz program that challenges users to answer up to twenty-five multiple-choice and true/false questions. The questions range from the derivative names of constellations to the distance of the nearest star (not Alpha Centauri, but Sol, our sun) from the earth. Players get several opportunities to answer each question and are awarded points according to the number of tries it takes them to supply the correct answer—three points for a correct answer on the first attempt, two points for a right answer the second attempt, and so on. Bonus points are given for getting more than one correct answer in a row.

Each correctly answered question is followed by a randomly generated phrase of encouragement such as, "You know almost as much about this as I do," or "You're the best we've had in some time," or "Dynamite." There's also a brief graphic and audio reward for correct



Above: A woman contemplates a twelve-foot model of the earth. Upper right: The observatory's twelve-inch Zeiss solar telescope tracks planetary movements in the sky above Los Angeles. Lower right: The business end of the observatory's telescope with its characteristic shuttered dome is open evenings to visitors free of charge.

answers. After each question has been answered, an explanation designed to provide players with a broader understanding of the subject is given.

Planet Waves. The questions are meant to be challenging but not impossible, and the explanations are always informative. Many questions have to be read carefully. Take this example: "The planet that is farthest from the sun *at this moment* is?" Four possible answers are given—Mercury, Jupiter, Neptune, and Pluto.

The correct answer, Neptune, is accompanied by this explanation: "Although Pluto is, on the average, farther from the sun than is Neptune, Pluto's orbit is not circular and crosses Neptune's orbit. From 1979 until 1999 Neptune is actually farther from the sun than is Pluto."

The second program in the exhibit, *Hangman*, plays the same way the original word guessing game does. The Apple builds a scaffolding, a noose, and finally a hanging stick figure on the screen, while the player makes a desperate effort to figure out which letters fill in the blanks. As in *Astro Quiz*, all the terms, names, and words used in this *Hangman* are astronomical in nature.

The final game in the exhibit, *Birthdates*, is not really a game at all, but rather an elaborate algorithmic program. Users enter their birthdates and, in return, are treated to a diagram showing the phase of the moon at their birth, the number of days a full moon preceded that date, and the total number of days that have elapsed in their lives. The program also translates these dates into their equivalents in the Chinese and Hebrew calendars.

Perhaps the most interesting feature of this program is its planetary calculations. According to the program, "Each planet takes a different amount of time to go around the sun, so each planet's year is a different length." The program gives the length of a "year" (in earth years) on each of the nine planets in the solar system, along with the user's age and birthdate as they would be on each of the planets.

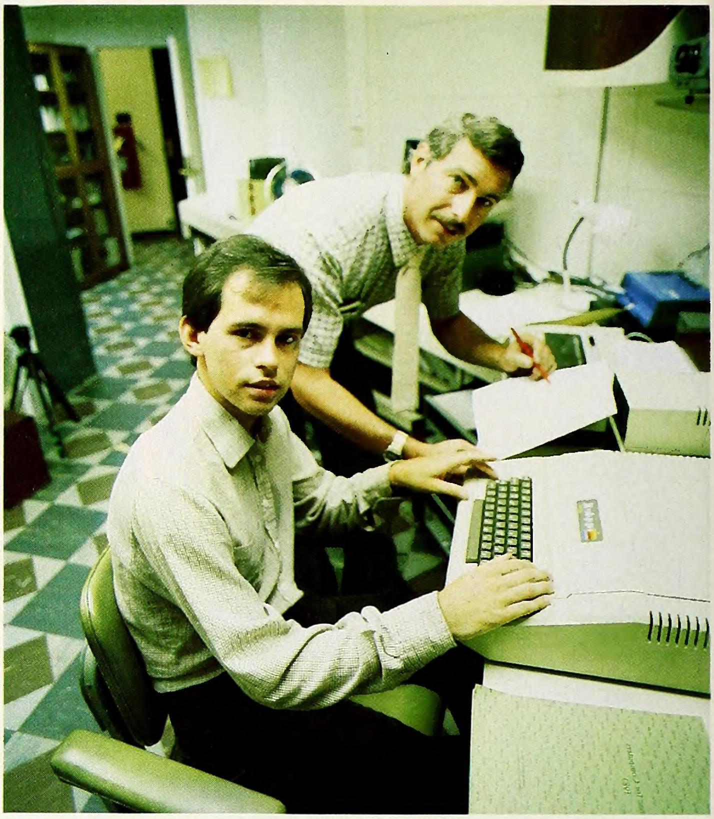
Born in the Red Spot. For example, an individual born on April 24, 1949, on Earth would be 34.26 years old. If that same person had been born on the planet Jupiter—assuming he could survive the titanic gravity and violently hostile and poisonous atmosphere—he would be a mere 2.89 years old. Jupiter's immense distance from the sun requires it to travel 11.86 Earth years just to complete a single orbit around Sol. The individual's next birthday would be on November 23, 1984.

All three programs in the exhibit are as foolproof as Scott could make them. He relied on conventional and unconventional methods of "crashproofing."

"I was writing these programs while I was just learning about the Apple. In fact, when they first put me to work I had never seen an Apple before and had only worked on similar Basic systems. I got gradually more expert, but I hadn't come across the machine language routine that kills the control-C break-in." Scott was thus forced to employ a rather "sledgehammerlike" approach, manually disengaging the control key.

"That was the last part of the protection mechanism," Scott recalls. "It is super-redundant really; I don't like to leave anything to chance. When I had to get into the program, I used the trick with the Integer card, enabling it so that when you reset, the computer goes in there rather than going to the auto-vector. From the Monitor, I could clear the flag at $D6, which prevents you from listing or saving the program."

In fact, storing an $FF at the Monitor memory location $D6—often called the "run only flag" or the "Applesoft mystery parameter"—



Left: A young visitor gazes at a display demonstrating the visible spectrum in a single shaft of light. Above: Programmer Peter Scott and John Mosley prepare slide-show contents for upcoming Christmas show. Right: Elementary-schoolers tour the observatory.

causes an Applesoft program to run, even if a user enters gibberish at the keyboard.

The Celestial Apple. Observatory director John Mosley, who owns his own Apple, explains how the Astronomical Apple exhibit originated. "Our support group FOTO wished to make a two-thousand-dollar contribution and asked if we could suggest an appropriate gift. I suggested the Apple.

"The idea was that we would use the Apple for word processing, astronomical calculations, and maintaining mailing lists," says Mosley. "And we would use it to develop programs that the public could operate."

With these goals in mind, and one gift Apple in hand, the observatory acquired a second Apple to put in the museum exhibit. The group has since acquired a third Apple and has plans to expand the exhibit this fall.

"Because we get crowds around the present exhibit, in the fall we'll have two Apples out there, each with identical programs," Mosley says.

Griffith Observatory uses its third Apple for a myriad of tasks.

"We're an astronomical information center and people with the craziest requests call us," Mosley says. "If a question is astronomical and reasonable, we try to answer it.

"We've gotten questions about things like the exact date of the New Moon in September 1692, from someone who's doing a history of the Salem witchcraft trials, or the precise position on the horizon where the sun will rise in Portland next month.

"We also require a fair bit of information ourselves. We publish a magazine—*The Griffith Observer*—with astronomical information in the back. Much of this information comes to us from commercially available sources, but much of it is calculated here."

Where To Look. The back page of *The Griffith Observer* is filled with useful information for star-gazers, on such subjects as the movements of the sun, phases of the moon, and locations and times to observe the planets (and even some of their moons).

"When someone calls in for information on sunrise, sunset, and twilight times, we use printouts that we've prepared for the year on the Apple. Those are common questions."

A partial list of the programs used by Mosley and the observatory staff—acquired from a variety of sources—reveals just how extensive are the uses to which the Apple is put.

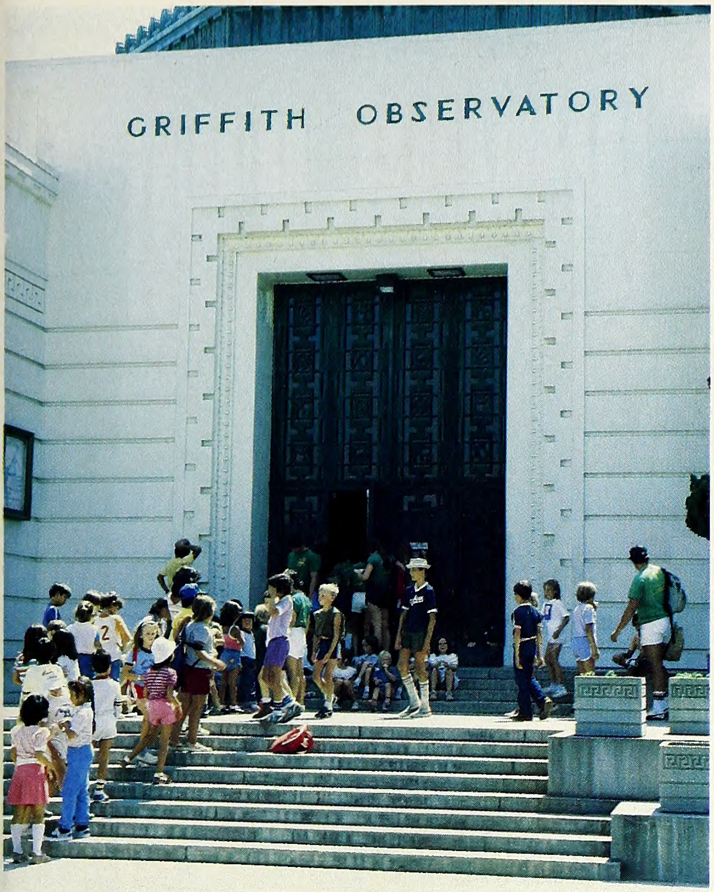
Altitudes and azimuths are calculated using programs created by a Canadian planetarium director, Bill Peters. Calendar conversions (Jewish, Gregorian, Julian) are made with *Calendar Conversions*, written by New York programmer Charles Kluepfel. The positions of the constellations at a given time may be determined using *Northern Constellations*, which was created by San Diego programmer Brad Schaper. Their outlines may be found in the *Star Gazer's Guide*, from Synergistic Software. Coordinate conversions are made using *Tellstar*, from Information Unlimited Software, another commercial program, and days between dates are calculated using *Calendar*, or *Calendar Moon Dates*, from *Call −A.P.P.L.E.*

Data on the distances between major cities of the world or between any two points on Earth, elements of a lunar eclipse, even exposure times for photographing the moon, planets, sun, and objects in outer space, are all kept on Apple disks.

From the volcanic plume simulation of Jupiter's fiery moon Io, found on *Io Plume* (written by San Francisco State University geologist John Westfall), to the instructions for telling time by the stars, on *Northern Constellations* (from *Call −A.P.P.L.E.*), the library of Apple astronomical software used by the observatory is impressive.

Astronomical Apples. Although no major astronomical discoveries have been directly attributed to the observatory's Apple, Mosley feels that microcomputers are moving rapidly into the scientific community, playing greater and more important roles.

"We used the Apple when the comet IRAS-Araki-Alcock [named after its three codiscoverers—the Infra Red Astronomy Satellite and the Japanese and English amateur astronomers Araki and Alcock] was discovered suddenly a few months ago," says Mosley. "We got the orbital elements [characteristics of the orbit] for it from the Harvard-Smithsonian Astrophysical Observatory, a station on the Harvard campus that coordinates such things—surprising new astronomical events. With a program called *Epheneris*, written by *Sky and Telescope* magazine editor Rodger Sinnott, we were able to run off the coordinates of where the comet would be in the sky. We then gave the news stations



and the public this information, providing the coordinates to people in places as far away as Alaska and Australia.

"We also have a hot-line number that gives astronomical information about what's currently happening in the sky," continues Mosley. "When some unexpected event is occurring, we can put that information out very quickly, changing the message every day. During IRAS-Araki-Alcock's appearance, information on the orbital position of the comet and how to find it was updated daily from data provided by the Apple. We received about seven hundred phone calls a day during the time of the comet."

The Jupiter Effect and Other Flights of Fancy. Another application for the observatory's Apple is the discrediting of outdated or superstitious beliefs.

"We did a planetarium show last spring on the Jupiter Effect, which is the crazy theory that the earth is going to be destroyed by earthquakes because of an alignment of planets. As part of the planetarium show, we wanted to take the alignment that was happening in November of last year and see how often this sort of alignment has occurred."

Mosley explains how this was accomplished. "We have a program that shows the solar system as seen from high above the elliptic plane, with the planets' orbits mapped out. We set the orbits for the current date and then ran the program so it traced the orbits back ten years. I looked for alignments, counted them off, and incorporated the information in the show."

Similar alignments, Mosley discovered, had occurred eight times in ten years. None had an appreciable effect on the earth's well-being.

Since the dawn of intelligence the elusive glittering specks in the night sky have captured the thoughts and imaginations of humankind. And for nearly half a century the Griffith Observatory has watched the skies, bringing new awareness to anyone who cared to learn more about the cosmic mysteries that surround us.

And so, while the eternal movements of the cosmos are being watched by people like those who staff the Griffith Observatory, it's reassuring to know that those movements are also being observed by the Apple. ◼

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And there's virtually nothing to memorize. Because editing and formatting commands are always right there on the keyboard. Word Juggler for the Apple III comes with special templates which identify principal word processing functions. On our version for the IIe, the editing commands are labeled on easy-to-install, replacement keycaps.

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Move and copy almost unlimited text at one time	YES	no	no
Prints documents with **bold face,** underlining, etc. via easy to use menu.	YES	no	no
"What you see is what you get."	YES	no	Only with 80 col. card
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MARKETALK

Reviews

Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

If the cryptic initials at the ends of reviews don't fit staff (listed on page 4), then they refer to guest reviewers—this month, Lucas X. Bozek, William H. Harrington, Forrest Johnson, Sharon Stea, and Ethan Winer.

Word Juggler IIe and **Lexicheck IIe.** By Tim Gill. A few months ago *Apple Writer IIe* rocketed like a shooting star to the top of the Bestsellers. It surpassed *Screen Writer II*, which had been the premier word processor on the Apple II; *Choplifter*, the arcade game that had held the number one spot with surprising tenacity since its release; and *VisiCalc*, perhaps the all-time bestselling Apple program. To what does *Apple Writer IIe* owe its sudden burst of popularity? Primarily to the fact that it was the first full-featured word processor written specifically for the new machine. Therefore, what is astounding about *Word Juggler IIe* is that it convinces you the Apple IIe was created especially for it, not the other way around.

Word Juggler, Quark's highly acclaimed word processor, started out life on the Apple III and apparently wasn't going to come down to the II until the Apple II was ready. *Word Juggler* gives the impression that you're working with a dedicated word processor—or as close to that as you can get. Think about how nice it would be to have labeled command keys instead of all those control commands to memorize. Obviously, *Word Juggler IIe* can't give you a bank of keys for all of its editing functions, but it can and does give you the labels. A set of nineteen keycaps is included with the program, along with a key tool to help you install them. The keycaps are identical to the Apple IIe keys except for the *Word Juggler* commands printed unobtrusively on the front.

Most word processors rely on mnemonic command keys to help you remember what the editing commands are, but sometimes you can't remember if you need control-S for search or control-F for find. What's worse, sometimes you can't remember if control-P means print or purge. With labels on the keys, you don't have to remember. Besides that, *Word Juggler IIe* eschews obfuscation still further by arranging commands in logical groups. For instance, all the block operations are together. More important, all the delete commands are in one place. After all, it doesn't do to mistake those for anything else. The end result of these key considerations is that *Word Juggler IIe* is one of the most learnable word processors there is.

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If your printer has the capabilities, the program also makes underlining, boldfacing, superscripting, and subscripting easy. The open-apple key and a lower-case "u," for instance, insert an inverse "u" at the cursor location to turn on underlining. Turning off underlining is done the same way, except with a capital "U."

Formatting commands are as easy to learn as editing commands. A strip of plastic placed over the top row of keys reminds you of all the printout options and how to get them. Just hit escape followed by the appropriate top-row key. The command is inserted into your document at the cursor location and there's no mistaking it for text because it's in inverse lettering. This way, you have complete and easy control over such things as spacing, pitch, justification, margins, and all the usual things.

Then there are the unusual things—like variables. *Word Juggler IIe* can read data from *Quick File II* or *PFS:File*, put the data into variables, and print multiple copies of a document with different information on each. Or you can make a data list on *Word Juggler IIe* itself. Variables can also be defined within the document being printed. Or, if *Word Juggler IIe* can't find a definition for a variable that is used, it will interrupt printing to ask you for the value. The obvious use for these capabilities is form letters, but there are related features that go beyond the level of the obvious. You can make entire paragraphs print or not print based on the value of one of the variables with a function much like Basic's if-then-else. Even format commands can be conditional.

Then there's the document insert command. Just put a file name into your document and another document will be inserted at printout time. You can do this as many times as you like, which means that you can create printed documents as long as you want with neither the hassle of learning WPL—as you would have to do with *Apple Writer*—nor the limitation on the number of files that *Screen Writer* imposes.

One pesky thing about using your word processor to write letters is that it's harder to make the envelope address come out right than it is to make the letter look good. For this reason, some people still resort to using an archaic device called a typewriter to address the envelope. *Word Juggler IIe* makes addressing the envelope less work instead of more. Just slide the envelope into your printer, move the cursor to the name and address at the top of the letter, and hit a key to transmit that line to the printer. Hit it again for each line of the address and you're done. If it's an informal letter and you haven't put the address at the top, *Word Juggler IIe* also has a straight typing mode, so the address still doesn't have to be a hassle.

Cursor movement is pretty simple. The four arrow keys do most of the work. When shifted, they move a word left or right, or a screen up or down. Control-shifted, they move the cursor to the beginning or the end of the line, or the top or bottom of text.

If you know anything about programming and ASCII codes, you may be wondering how an arrow key, which is a control character, can be shifted or control-shifted and look any different. This little piece of magic can be attributed to a hardware adaptation that comes with *Word Juggler IIe*. It works basically on the same principle as the shift-key modification on the Apple II Plus. That means that the program can read the control and shift keys independently of the rest of the keyboard. After all, if you're going to bring a program down from the Apple III, you want to bring it down with all its features intact.

Many word processors display things on-screen the way they'll appear on the printout, with justification, indents, page breaks, and so on. That's great, but if you want to write something in more than eighty columns some of these programs will make you scroll left and right to see the whole thing. That makes reading the document difficult. Nevertheless, some people like to see how the document will appear in its final form. *Word Juggler IIe* offers a good alternative: You edit in eighty columns. Then, to see what the printout will look like, you hit a key to display the document. The display follows the format commands you have inserted, so you'll see the margins, justification, indents, page breaks, and so on. If you've set a width greater than eighty characters, you can scroll the document left and right to see it all. Text that is underlined, boldfaced, superscripted, or subscripted is shown in inverse.

Word Juggler IIe operates under ProDOS, the new disk operating system for the Apple IIe that Apple announced a few months ago and will release a few months hence. This means that there could be a few difficulties in file compatibility with other programs, except that Quark has taken care of the important ones. *Word Juggler IIe* is capable of loading DOS text files or Apple Pascal files. If you want to convert the other way, *Word Juggler IIe* won't do it, but ProDOS will when it's released.

Word Juggler's association with ProDOS has more important implications for the business user. For one thing, it's completely file-compatible with Apple III SOS. For another, when ProDOS is released, it will allow you to use Apple's hard disk drive, the ProFile, with *Word Juggler IIe*.

As a companion to *Word Juggler IIe*, Quark offers *Lexicheck IIe* to check your spelling. *Lexicheck*'s greatest virtue is that it acts like part of *Word Juggler IIe*; just put the dictionary disk in the drive and press a special command key and *Lexicheck IIe* will go into action. Words that it can't find in its fifty-thousand-word vocabulary are shown in context, and you have the choice of accepting them or changing them. If you change a word that appears more than once, it changes all of the occurrences of that word. When it's done, *Lexicheck IIe* puts you back into *Word Juggler IIe*. It couldn't be simpler to operate. If you have special terms or jargon that you use frequently, you can construct an auxiliary dictionary of those terms. You enter a word into the extra dictionary by hitting a special key when the main dictionary flags the word. That way you won't accidentally duplicate any words already covered in the main dictionary.

Word Juggler alone is a terrific word processor. With *Lexicheck* it goes a long way toward error-proofing your written work, and both programs are well recommended. Quark distinguished itself with a fine line of computer software for the Apple III. We hope that these two programs are only the first of many that Quark will bring out for the Apple IIe. DD

Word Juggler IIe and *Lexicheck IIe*, by Tim Gill, Quark (2525 West Evans Avenue, Suite 220, Denver, CO 80219; 303-934-2211). *Word Juggler IIe*, $239. Requires eighty-column card. *Lexicheck IIe*, $129. Requires *Word Juggler IIe* and 128K.

The Last Gladiator. By John Field. First of all, let's acknowledge a kind of breakthrough in software packaging. As you know, many companies release games with package art consisting of a movie-poster-style rendition of some colorful scene that isn't even remotely possible in a computer game. Pens, brushes, and wishful thinking can still achieve a higher resolution than computer pixels. As you may further know, some

companies are now putting photos of actual screens from the game somewhere on their packages. But it was up to Electronic Arts and *The Last Gladiator* to give us a back-cover screen illustration that does not look as good as the actual game. Instead, it resembles a game for the Atari VCS—and an old one at that.

Why any company would want to fool you into thinking theirs is a lo-res game is anyone's guess. When you boot up the game, however, you go toe to toe with some charming little hi-res monsters inside an imaginary coliseum. You can start with a gun (you brave warrior, you), but your increasing gladiatorial prowess will soon require you to trade it in for a club, then a javelin, then a trident, and finally a boomerang. In a nifty antisexist flourish, you can choose to be either a gladiator or gladiatrix, in addition to choosing your starting level and weapon.

Upon entering the arena, you can tell immediately who in the crowd is for you and who is against you. Smiling faces and frowning faces give it away. Don't waste time thinking about that, however. Run to your weapon and pick it up before the gate lifts, unleashing your first opponent. Typical enemies are octopi, spiders, robots, snakes, and vampires, which shift from bat to humanoid and back. From there, the roster goes on through some mercifully nameless species. With almost all of them, the best strategy is to move when the gate starts to come up, then ace them with extreme dispatch. Otherwise, it can get very hot and crowded in the arena. In scenarios where retrieving a thrown weapon is a requirement, you'll want room to maneuver.

By themselves, none of your foes are particularly formidable once you get to know them. The only entity you'll want to maintain a respectful distance from is the snake. It has to be hit just right, and repeatedly. Otherwise it'll keep coming—growing longer and longer or splitting into more snakes. Hmm . . . sounds like an earthworm.

The point is, an okay game from Electronic Arts is the equivalent of something outstanding from just about anyone else. The graphics and animation of *The Last Gladiator*, while certainly superior to what's on the package, are adequate to the task and a professional job, but no more. The play is the thing here. The variety of monsters and the novelty of close combat in a genre where battle has been previously characterized by vague, generic energy zaps combine to make the game sufficiently engrossing to warrant more than a few go-rounds.

Moreover, if you've been avoiding arcade games for fear that young punks would laugh and point and say rude things about your eye-hand coordination, you should consider giving this one a try. AC

The Last Gladiator, by John Field, Electronic Arts (2755 Campus Drive, San Mateo, CA 94403; 415-571-7171). $35.

Accounts Receivable. In today's business world, being able to access a wide variety of information about your company's accounts receivable is an invaluable management tool. For example, knowing how much cash your company can expect to receive to meet the week's financial obligations or being able to check a customer's accounts without searching through a pile of papers could come in handy, to say the least.

State of the Art's *Accounts Receivable* is one module of an integrated accounting system designed to take the paper shuffling out of business. All modules in the system can be used independently or in conjunction with each other.

The accounts receivable module takes a bit of time to set up, but the effort is worth it considering the module makes so many reports and output records available.

In addition to the basic information that must be entered to run the program, *Accounts Receivable* allows for a division file, terms code file, sales tax file, and salesperson file. The last can keep commission records for twenty-five salespeople that can be called up in order to look at sales trends or for periodic checks on salespersons' activities and customer contacts.

In addition to making day-to-day accounting easier and more streamlined, the program offers a variety of valuable reports. Among these are a sales journal, a general ledger detail report, a cash receipts journal, a customer listing, and an aged invoice report, which tracks open and paid invoices.

The module also provides a customer sales analysis with month and year-to-date figures, a service charge journal, a sales tax report, and a salesperson commission report with month and year-to-date sales and commissions. Other reports print customer statements and labels and indicate accounts sold by each salesperson. With access to so many reports, the user can quickly obtain an almost endless variety of information about the status of cash flow, customer accounts, sales activities, and other operations fundamental to the business.

If desired, *Accounts Receivable* can be interfaced with the *General Ledger* program, and receivables will be directly posted to the *General Ledger*. It may also be linked to other modules in the system, such as *Sales Invoicing* and *Inventory Control*, among others.

In any case, whether used alone or with other modules, State of the Art's *Accounts Receivable* is a program whose design, ease of use, and packaging combine to make it a worthy complement to its company name. SS

Accounts Receivable, State of the Art (3183-A Airway Avenue, Costa Mesa, CA 92626; 714-850-0111). $495. Apple III, $595.

Cubit. By Abe Oswal. A pyramid of cubes and clean geometric lines and planes. But they're the wrong color. One conscientious little critter can change them, just by bouncing on them. A gremlin can change them too, but he's more imp than conscience; he changes them back to what they shouldn't be.

And someone keeps dropping lethal gumdroplike balls down the steps. Occasionally, a ball is not a ball but is a snake, or becomes one on the bottom cube. Balls are mindless, but snakes stalk their victim—which is, of course, the conscientious little critter.

It has another name in the arcades, and still another on another computer, but the principle's the same: a solid, well-thought-out strategy arcade game. Manual dexterity is required, although not necessarily as refined as that needed for shoot-'em-ups, eat-'em-ups, or busy-work games. And skillful fingers won't do a bit of good beyond the first few screens without clear strategy.

Micromax's clean-lined graphics emphasize the strategy rather than the arcade. Bells and whistles are sparse, although well-used sounds add to the playability. The company has taken care to plan the use of colors to make the game as playable on monochrome monitors as on color ones. Also absent and not missed are delays between levels or between ending and restart; it's all instant. Escape is available if respite you must have.

An adult, well-made interpretation of a good game, *Cubit* rests its case. If you were the jury and had to give back the game once you'd an-

nounced your verdict, you might choose to remain sequestered for a long, long time. MCT

Cubit, by Abe Oswal, Micromax (6868 Nancy Ridge Drive, San Diego, CA 92121; 619-457-3131). $39.95. Joystick optional.

Beagle Basic. By Mark Simonsen. Evolution leaves us all behind. In the mechanics of survival of the fittest, only those traits that are counter to survival are weeded out. Traits that assist in survival are accentuated. However, old organs such as the once-useful appendix never disappear.

Computer hardware, when it's no longer needed, usually disappears. You don't see many RF modulators around anymore. Once they roamed these hills in the thousands. There's a generation of kids growing up today that have never seen a one-wire shift-key modification. And yet, computers have their vestigial organs. The Apple IIe still has cassette ports and a sixteen-pin game I/O connector; you won't see many people using those in a year or two. But most of the Apple IIe's genetic hand-me-downs reside in firmware.

Applesoft has remained virtually unchanged since it came down from cassette to live in ROM. Since the arrival of DOS, however, some of Applesoft has become dormant. The code remains, but the functions have atrophied from inactivity.

Evolution would let it stay.

A systems programmer, however, would throw it out and put something worthwhile in its place. A ROM is a terrible thing to waste.

Well, actually, a ROM is a difficult thing to convince people to replace. This is primarily because a chip-pulling tool looks like something a dentist would use, so people are afraid of it. With the bank-switched memory (the upper 16K) in the IIe and the widespread use of RAM cards in the II Plus, why not move the whole language into that RAM and fiddle with its genetic code there? (Zat vay, Herr Doktor, we can vipe it all out if ze experiments go astray.) (Good thinking, Igor.)

This is precisely what Mark Simonsen has done with *Beagle Basic*. And so as not to leave you out of the fun, *Beagle Basic* offers a mass of new commands, tells you which old commands they replace, and lets you choose between them. When you are done, *Beagle Basic* saves the hybrid language to disk under the Orwellian name Newbasic.

The reason that each command added must replace a previous command is that Newbasic takes up the same space as Applesoft. It also uses the same tokens for its keywords, and there are a limited number of values that can be used as tokens. Unlike some utilities that expand Applesoft's repertoire, *Beagle Basic* doesn't use the ampersand command.

This is nice because it makes Newbasic programs more memory-efficient. And the Newbasic routines use no more memory than that which they replace. This is not to downplay the usefulness of ampersand routines; they are still much more flexible in the kinds of enhancements they can add to Applesoft than *Beagle Basic* is. One more nice thing about *Beagle Basic*, however, is that it still allows you to use ampersand routines.

The most needed of the commands you can substitute into Newbasic is *else*, the prodigal son of *if-then*. Else lets your conditional commands take a special action if the condition is false, instead of just moving on to the next line. Using else can help to clarify a lot of otherwise twisted logic. Another useful new command is *swap*, which trades the values of two variables without the use of a temporary variable. This can speed up sort routines, as well as preventing the creation of garbage strings, and the new *tone* command allows you to make sounds of a specified pitch and duration.

A clever feature of *Beagle Basic* is that the most useful new commands replace the least important old commands. The three commands mentioned earlier replaced the cassette shload, load, and save. Some of the less significant Newbasic commands replace things like *wait* and the lo-res commands.

Other Newbasic commands perform such functions as reading a pixel on the hi-res screen, scrolling the text screen down, clearing the keyboard buffer, and allowing you to use text page two and lo-res page two.

There are three groups of commands offered to replace lo-res capabilities. You use only one of these groups in any version of Newbasic. (Of course, you can create as many versions of Newbasic as you like.) One group offers commands that clear to the end of the line, clear to the end of the page, scroll the screen up, and ring the bell. The second group gives you control over graphics and text screen switches, and the third group allows you to move the cursor in four directions. All of these groups are things that can be done with unmodified Applesoft, but not as easily.

Beagle Basic also allows you to use variables to indicate the line numbers in goto and gosub commands. This practice can get you into trouble, however, when you renumber programs, so be careful. You can also change the sound of the bell and the appearance of the escape editing cursor. The bell change is cosmetic but the editing cursor is useful, since there is currently no visual way to tell whether you are in editing mode or not, unless you are using a IIe in eighty-column mode.

Finally, *Beagle Basic* offers you the opportunity to change command names and error messages. There may or may not be much point in doing that, but it can be kind of fun, as Beagle's earlier bestseller *DOS Boss* proved.

Beagle Basic is well implemented—an easy-to-use inventive approach to an old problem. And there's no denying that "Typing Goof! (peep)" is more fun than "?Syntax Error (beep)."

Is there? DD

Beagle Basic, by Mark Simonsen, Beagle Bros (4315 Sierra Vista, San Diego, CA 92103; 619-296-6400). 64K. $34.95.

Stickybear Basketbounce. By Richard Hefter and Jamie and Steve Worthington. The button-down bear strikes back. Nattily attired in a blue serge suit, the hottest star in the educational game firmament is clearly enjoying himself in this purely escapist entertainment. Evidently ready for a more whimsical outing after his impressive educational performances in *Numbers* and *ABC*, Stickybear displays in *Basketbounce* a physical grace and dynamic screen presence previously only hinted at.

With nothing but a series of large baskets, he nimbly maneuvers under a series of industrial outfall ducts, keeping the environment free of excess bouncing bricks, balls, doughnuts, rubber stars, and assorted other detritus of arcade factory production. His leaps, at the touch of a button or space bar, would shame Nureyev. They are necessitated by the inevitability of uncaught objects, which remain to become navigational hazards.

As advertised, this is a game for the whole family. Sixteen screens of increasing difficulty pass by before the game switches back to the beginning; and it will be a long time before anybody sees them all. The game

is aimed primarily at children (stickers and a mobile included), apparently because the graphics are big, clean, and colorful, and there is no shooting, squishing, hacking, or stabbing. In fact, the only penalty for failure is the sight of S.B. being dumped on his can and ultimately nudged off-stage by a bulldozing monkey.

No matter its intended audience, *Stickybear Basketbounce* is simply a good, involving arcade game capable of looking respectable next to anything else in the genre currently available for the Apple. AC

Stickybear Basketbounce, by Richard Hefter and Jamie and Steve Worthington, Xerox Education Publications (245 Long Hill Road, Middletown, CT 06457; 203-347-7251). $39.95.

Write Away. By Doug Stinson. There have got to be more word processors than any other type of Apple business program. *Write Away* is a relatively new entry in that crowded marketplace; however, it has capabilities that should distinguish it from the pack. The program is full-featured and powerful, yet it can also introduce beginners to the benefits of electronic editing. And it accomplishes this without getting bogged down in esoteric ramblings.

Write Away features five tutorials, each applicable to the various phases of text editing. Its capabilities include managing a mailing list, interfacing with *VisiCalc* DIF files, and utilizing predefined macros—words, phrases, or lines of text that may be represented by a single keystroke. For example, you could define the "s" key to print "Sincerely, John Doe" every time you pressed it. A lawyer, on the other hand, may decide to set up the "e" key to automatically type "the estate of." For phrases that occur frequently throughout a text, the macro feature can save time and tedium. In fact, it is one of the most powerful attributes of *Write Away*.

Unfortunately, the more a program is capable of doing, the more the user is required to learn. This holds true for *Write Away*, but at least the multitude of editing and printing commands are represented by logical key sequences. For those who struggled learning *WordStar*, this is indeed a welcome relief!

Write Away's text may be viewed in a variety of ways. The user can tab through it a letter at a time, a word at a time, by paragraph, or even by pages. The document may also be searched for the occurrence of a particular word or phrase, and that phrase can be replaced with another, depending upon whether certain criteria are true. For example, if the name at the beginning of a form letter includes the prefix "Miss" or "Mrs.", then all references to "he," "him," or "his" will automatically be changed to "she," "her," or "hers." Pretty neat, huh? Those logical operators can be used in a variety of combinations although they are advanced features and need not be mastered to use the program.

Waiting for the disk drive to load the next module is one of the most annoying attributes of any computer program. *Write Away* avoids the finger tapping. Although it is a large program divided into two modules, *Write Away* will automatically recognize the existence of a memory expansion card and load the printer driver program there. In this way, the *entire* program is live in memory at one time, and the user need never wait to continue working. To increase operating speed the program also includes a special fast disk routine that will save or load a document in about one-third the time Apple DOS takes.

Since the word processor uses standard Apple text files to store documents, it may also be used to create exec files or to edit Applesoft programs. Its ability to read only a particular record from a random access file should be of interest to programmers. In addition, data and text files from other programs may be converted to *Write Away*'s format using one of several translator programs. This capability can facilitate editing other people's work. Coupling the mailing list ability with the intelligent replace option and a *VisiCalc* template, an enterprising corporate manager could write a standard quarterly report once and never have to touch it again. As the facts and figures changed each period, the appropriate sentences and paragraphs could be included or omitted with each printing. Meanwhile, Fred Powertrip can be out drinking beer while his Epson does all the work!

Error-trapping is delightfully complete as well. All efforts to delete locked files, edit nonexistent text, or enter inappropriate commands are dutifully rejected. A warning is printed before any action that could cause the loss of a file, and the user is required to answer whether or not he wishes to complete the action before proceeding. Even pressing "reset" simply returns control to the previous menu.

But perhaps the most important aspect of *Write Away* is the lack of copy protection. With word processors, it is essential to be able to make safety copies of the original, and then to be able to rewrite the printing format and printer control codes back to these copies, without fear of damaging the master disk.

All told, there are so many positive features incorporated into *Write Away* that it would be hard not to recommend it for use in business, or by any serious student or professional writer. EW

Write Away, by Doug Stinson, Midwest Software Associates (Box 301, Saint Ann, MO 63074; 314-997-6470). $175.

Geopolitique 1990. By Bruce A. Ketchledge.

Another late night at the White House. The usual gang was sitting around drinking coffee and watching television. It was a live transmission from Japan. Angry Japanese were throwing rocks at the U.S. embassy. As the top officials of the U.S. government watched, the mob broke into the building and started throwing files into the street. Then they found an American flag and burned it for the camera. In the background, Japanese police watched with amused expressions.

The secretary of state got up and turned the set off. "Well, that's that," he said. "We can't do much but send a protest, and I don't think the new government will pay much attention. I told you it was a bum idea to put a bug in the emperor's teapot."

The secretary of defense said, "It was just a freak accident. We couldn't have known it was going to come loose and fall into the Indonesian ambassador's cup during a reception."

"I think Borostov is behind this," said the national security advisor. "His slogan is, 'Erode the U.S. geopolitical position now!'"

"Ouch," said the secretary of the treasury. "Those Ruskies need some better slogans."

"I don't think you can blame it all on the Russians," the secretary of state said. "I've had nothing but trouble from our so-called allies since we invaded Mexico."

The secretary of defense winced. "Let's not bring up that again. We've got a problem here. We'll have to pull our troops all the way back to Hawaii unless we can find some new bases."

"Suppose we asked Red China for bases on the mainland?" the national security advisor asked.

CAN A COMPUTER MAKE YOU CRY?

Right now, no one knows. This is partly because many would consider the very idea frivolous. But it's also because whoever successfully answers this question must first have answered several others.

Why do we cry? Why do we laugh, or love, or smile? What are the touchstones of our emotions?

Until now, the people who asked such questions tended not to be the same people who ran software companies. Instead, they were writers, filmmakers, painters, musicians. They were, in the traditional sense, artists.

We're about to change that tradition. The name of our company is Electronic Arts.

SOFTWARE WORTHY OF THE MINDS THAT USE IT. We are a new association of electronic artists united by a common goal — to fulfill the enormous potential of the personal computer.

In the short term, this means transcending its present use as a facilitator of unimaginative tasks and a medium for blasting aliens. In the long term, however, we can expect a great deal more.

These are wondrous machines we have created, and in them can be seen a bit of their makers. It is as if we had invested them with the image of our minds. And through them, we are learning more and more about ourselves.

We learn, for instance, that we are more entertained by the involvement of our imaginations than by passive viewing and listening. We learn that we are better taught by experience than by memorization. And we learn that the traditional distinctions — the ones that are made between art and entertainment and education — don't always apply.

TOWARD A LANGUAGE OF DREAMS. In short, we are finding that the computer can be more than just a processor of data.

It is a communications medium: an interactive tool that can bring people's thoughts and feelings closer together, perhaps closer than ever before. And while fifty years from now, its creation may seem no more important than the advent of motion pictures or television, there is a chance it will mean something more.

Something along the lines of a universal language of ideas and emotions. Something like a smile.

The first publications of Electronic Arts are now available. We suspect you'll be hearing a lot about them. Some of them are games like you've never seen before, that get more out of your computer than other games ever have. Others are harder to categorize — and we like that.

WATCH US. We're providing a special environment for talented, independent software artists. It's a supportive environment, in which big ideas are given room to grow. And some of America's most respected software artists are beginning to take notice.

We think our current work reflects this very special commitment. And though we are few in number today and apart from the mainstream of the mass software marketplace, we are confident that both time and vision are on our side.

Join us. We see farther.

ELECTRONIC ARTS™

TO LEARN MORE about our growing number of titles — and to receive a free poster of the artists pictured here — stop by your favorite computer store or software center. If you need help finding the Electronic Arts dealer nearest you, write us at 2755 Campus Drive, San Mateo, California 94403 or call (415) 571-7171.

SOFTWARE ARTISTS? "I'm not so sure there *are* any software artists yet," says Bill Budge. "We've got to earn that title." Pictured here are a few people who have come as close to earning it as anyone we know.

That's Mr. Budge himself, creator of PINBALL CONSTRUCTION SET, at the upper right. To his left are Anne Westfall and Jon Freeman who, along with their colleagues at Free Fall Associates, created ARCHON and MURDER ON THE ZINDERNEUF.

Left of them is Dan Bunten of Ozark Softscape, the firm that wrote M.U.L.E. To Dan's left are Mike Abbot (top) and Matt Alexander (bottom), authors of HARD HAT MACK. In the center is John Field, creator of AXIS ASSASSIN and THE LAST GLADIATOR. David Maynard, lower right, is the man responsible for WORMS?

When you see what they've accomplished, we think you'll agree with us that they can call themselves whatever they want.

the appeal.

On the other hand, the approving trills and encouraging phrases, such as "That's the number" and "A real computer," are pleasing, and, because in all but *CatchaCake* the user has several opportunities to get the right answer, kids can receive plenty of positive reinforcement. This program will help the pocket-calculator generation learn or review their basic arithmetic. JP

Early Games Piece of Cake, by Robert Eyestone, Counterpoint Software (Suite 218, 4005 West Sixty-fifth Street, Minneapolis, MN 55435; 612-926-7888, 800-328-1223). $29.95.

Skyforth 1.1. By Thomas J. Tosch. This is a Forth operating system for the Apple. It includes the programming language Forth and a number of special capabilities: an on-board tone generator, an editor, an assembler, built-in sorting routines, and the capability of using special character sets. If you think your Apple is powerful now, wait till you see what it can do with *Skyforth*!

But before we get into that, a word of caution: Forth is an odd language. The people who have worked with it tend to be very passionate about it. Some of them love it and some hate it, but nobody thinks it's just okay. You can start an argument at a programmers' meeting just by mentioning the name. This is partly because Forth requires you to learn new thinking habits. It's similar to assembly language in that its logic is closely related to the logic of the hardware itself—which is both good and bad from a programmer's viewpoint.

The good part is that this gives the programmer tremendous power. If the logic you use in your program is closely related to the logic of the computer it runs on, you can do large and powerful things with small and simple programs; your programs will run faster and take less memory space. The Apple doesn't have to waste time translating its thoughts into human-type language and then translating your thoughts into machine code.

The bad part, of course, is that you have to do all that translating yourself. You have to learn to think in patterns similar to those the machine uses and then write those patterns into your programs. You have to do quite a lot of work before you can take advantage of the power of Forth. As the ancient wise man said, "There's no such thing as a free lunch!"

Skyforth is not a Forth tutorial, but if you're already familiar with the language, it is a very comfortable environment to work in. The system dictionary is large and well chosen, and it can be extended with a variety of utility routines. Most of these are included in source code form, so you can examine them with the editor to see how they work.

Unlike some other versions of Forth, *Skyforth* fits neatly into the Apple operating system, making a combination that has the best features of both. It either supports or replaces most Applesoft and DOS commands, sometimes with significant improvements. We cannot begin to cover all of the goodies, but here are some high points.

In high-resolution graphics, you have all the usual Apple capabilities and some new ones. In addition to vector shapes, you can have block shapes (rectangular, any size, defined by bit patterns—intricate animation figures, and so on) and character shapes (block shapes the size of ASCII characters—in other words, special character sets). You can work on one hi-res screen while you display the other and toggle between them at will. Best of all, these routines operate at assembly language speeds—*fast*.

Speaking of fast, the system has a special "load from disk and run" mode that is startling, if you're used to DOS speeds. This technique requires you to do your own DOS bookkeeping, but the speed advantage is worth it. And if that's still not fast enough for you, there's a version of *Skyforth* that works with a hard disk in addition to DOS. Another version supports an arithmetic processor, if you want ultrafast number crunching.

But we haven't space to describe all the goodies. Let's just say that *Skyforth* is an elegant marriage of Forth and the Apple. If you're looking for a Forth system with extras, you ought to investigate this one. JR

Skyforth 1.1, by Thomas J. Tosch, Tosch Information Associates (3711 Southwest 107th Street, Seattle, WA 98146; 206-246-3839). $95.

Parthian Kings. By David W. Bradley. In feudal times, land meant power. This tenet is re-created today in city-state warfare for one to four players. Set in the mythical kingdom of Parthia, a land complete with kings, wizards, and a host of fantastic creatures, *Parthian Kings* allows players to create a fantasy world filled with lusty battle and shrewd shrewd strategy in a land where magic is your best friend or your worst enemy.

The players in *Parthian Kings* select which of four city-states will be their capital. Then the colorful hi-res towns suddenly grow into magnificent citadels with the player's flag fluttering from the ramparts. Players can design and save their armies, selecting from five unit types. The characteristics that vary from type to type are strength, armor, weapons range, and movement. After the units are selected, the computer automatically computes the cost of each. Stronger, faster units are a greater burden to the poor, overtaxed peasants.

Parthian Kings allows players to create and save their own unique battlefields with various terrain types, including clear areas, forests, lakes, and impassable mountains. Avalon Hill has included one scenario map on the disk.

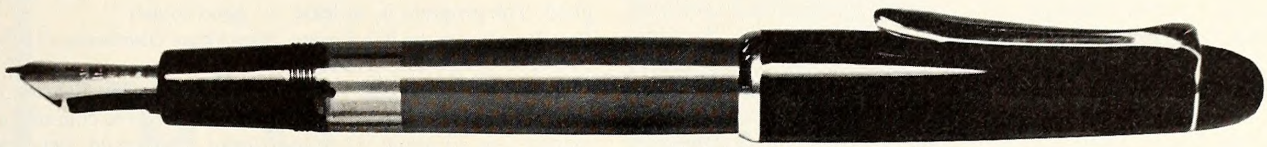
Game play begins with players choosing between a fight to the finish and a short game limited to a fixed number of turns. Next, players are given the option to use the magic of the kingdom's resident wizard. With a wave of his wand, terrain changes instantly or the strength of a friend or foe waxes or wanes. Of course, even a wizard can have a bad day, so spells don't always work as intended. As your wizard gains experience, he learns new and more powerful spells.

During each turn, players are given a report of the current census, tax rate, and number of armed divisions. Using the tax revenue of your kingdom, you raise armies and dispatch them to the front. As king, you set the tax rate, but if you get too greedy, your peasants might stage a tax revolt.

In the strategy phase of each turn, players move their units. While units may not be stacked, they may be transported to the battle area in convoys. Combat is relatively unsophisticated; there's no way to select tactical attack or defense options for individual units.

Strategy and tactics in *Parthian Kings* revolve primarily around the need to capture and occupy the opponent cities, but there are sociological considerations as well. Players must balance the need to expand the military with the need to sustain and nurture the city-state's economy. Captured city-states can provide further loot and resources. While magic

Business letters to go.*



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may advance your cause, fate can just as easily turn these occult forces against their ambitious masters.

While both the economic and military simulations are highly simplistic, the option of creating your own armies and game board designs adds a lot of variation. The computer as opponent is extremely aggressive; in three-player games, play may shift wildly, with victory unsure till the last battle. Add a mixture of fantasy and imagination, stir in a little strategy and a pinch of luck, and the fantastic kingdom of *Parthian Kings* may be just the place to let your mind wander. WHH

Parthian Kings, by David W. Bradley, Avalon Hill (4517 Harford Road, Baltimore, MD 21214; 301-254-5300). $25.

Font Downloader. By Bob Kovacs. When Apple released its Dot Matrix Printer, the manual contained tantalizing hints of a capability for printing with custom character sets. The demo program packaged with the printer, *DMP Exerciser*, had a menu selection for downloading a custom character set to the printer; but alas, selecting that option brought only a message that the option was not yet available. It was possible to do it yourself, but it wasn't easy; the necessary control commands were discussed with great brevity and only on the reference card. For the most part, that was that.

Except that someone was bound to figure it out sooner or later. Bob Kovacs seems to be the one who figured it out sooner. His *Font Downloader* comes with four fonts ready to be loaded. Once loaded into the printer, a font can be used by any other program. It's even fairly easy to switch between the built-in font and the custom font with any word processor that allows the insertion of control characters.

The program also includes an editor, which works on the graphics screen. Any character can be selected from an array of the entire printable character set (ASCII 32 through 127) and edited point by point. The editor uses keyboard input, making it easier to use than the *DOS Tool Kit* character editor. The character is edited on an eight-by-eight array, which is a difficult size to deal with. Upper-case letters typically use the top seven pixels of an array. Using fewer pixels makes certain letters look awkward. However, making the upper-case characters seven dots high leaves only one dot for descending lower-case letters without raising the rest of those letters.

So how come the printer's regular character set has full descenders and good-looking capitals? A close look at a printout reveals that it uses a matrix that is nine dots high. And, in fact, it's possible to create custom characters on a nine-dot matrix, with one catch: Each character may be eight dots in height, but it can be the top set of eight or the bottom set. And no single character needs both the top and bottom rows.

Unfortunately, *Font Downloader* doesn't take advantage of this feature. Nor does it provide for the sixteen-dot-wide characters that are also possible with the DMP. But it is a start, and it does allow you to print with a character set of your choice. In all fairness, the difference is only one dot; the program can do fonts with a higher resolution than the characters on your screen, and the editor, for what it does, is reasonably good. The program is, at least, a "good sooner." DD

Font Downloader, by Bob Kovacs, Micro-Ware Distributing (1342-B Route 23, Butler, NJ 07405; 201-838-9027). $39.

Health-Aide. Everyone wants to stay healthy, but figuring out the best way to go about it can be a lot of work. It involves counting calories, remembering all about what constitutes a balanced diet, and planning menus. It can mean reading a lot of diet books and learning some basic nutritional facts. It can also mean keeping track of what you've eaten, breaking it into calories, and analyzing it all. Then there's the question of exercise: trying to decide what's best to keep weight down and burn up calories. Usually, there are unique personal needs or problems involved: blood pressure, need to avoid salt, vitamin requirements. A great deal of information, planning, and work goes into creating a healthy diet and lifestyle.

Health-Aide, a computerized comprehensive nutritional and health planning program, is intended to simplify, cut the time, and minimize the work of staying healthy. Once you've provided it with some personal information, *Health-Aide* provides a listing of the RDAs (recommended dietary allowances) for nutrients in foods.

When you've created this basic file, you can begin to create and track nutritional intake, exercise, and personal data on a daily, monthly, or yearly basis.

Announcing

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STELLAR 7

by Damon Slye ™

RAVEN, an experimental Agrav Unit, is Earth's only defense against the Imperial Arcturan Armada. Commanding RAVEN, you will face Arcturan laser tanks, pulsars, sandsleds, assault batteries, prowlers, skimmers, seekers, guise mines, and the rest of the rampaging Arcturan assault. Your wits and RAVEN's biphasal thunder cannon are all that stand between a helpless Earth and the wrath of the Arcturan Armada.

Sandsled and Skimmer

SOFTWARE ENTERTAINMENT COMPANY introduces *STELLAR* 7, the ultimate 3-D strategy arcade game by Damon Slye. *STELLAR* 7 features smooth HI-RES animation, a colorful instrument panel, and 7 unique levels, each more challenging than the last.

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Dealer inquiries invited.

Stalker Agrav Unit

Requires Apple II, II plus, or IIe • Apple II is a trademark of Apple Computer, Inc. • copyright 1983 SOFTWARE ENTERTAINMENT COMPANY

You create a meal from a list of 700 foods, for which thirty-three nutrient values are stored. *Health-Aide* provides a complete nutrient analysis of it, including a protein-analysis breakdown of the eight essential amino acids. Then it recommends foods to add to the meal if the protein is unbalanced. It also provides a readout of the percentage of the RDA being fulfilled. At the same time, it tracks four nutritional elements of your choice. The nutritional analysis is quite complete. The only essential vitamins missing from it are vitamin D, PABA, and pantothenic acid; why these aren't included is a mystery.

If losing weight is a goal, *Health-Aide* helps in a number of ways. It calculates energy expenditure for a variety of activities and total caloric use and comes up with a recommended caloric intake for losing weight. Setting up a diet becomes easy: Several well-balanced menus for breakfast, lunch, and dinner for seven different caloric values (from one thousand to three thousand calories a day) are provided. You can select from these and replace foods you don't like with others from a food substitution list.

While planning menus, you can determine which foods are the best sources of nutrients and which are the cheapest. You can call up two lists of foods containing each nutrient; one is sorted on the basis of quality and the other by price. Also while preparing menus, *Health-Aide* makes a shopping list for the meals being planned, according to the number of eaters. It is also possible to add foods and create and store original menus. SS

Health-Aide, Knossos (422 Redwood Avenue, Corte Madera, CA 94925; 415-924-8528). $79.95.

Conquering Worlds. By Walter Hochbrueckner. With this summer's release of *Return of the Jedi*, everyone is excited about epic space battles and planet conquests. *Conquering Worlds* lets you in on the action. With a tip of the helmet to Fred Saberhagen's famous *Berserker* series, *Conquering Worlds* pits you against a horde of invading robots who are bent on destroying all mankind and purging the universe of inferior creatures.

Mankind is initially allocated one planet in a random star system. Each of the thirty-two star systems has between two and eight planets. The robots also start somewhere in the galaxy on a single planet. Now begins a game of cosmic leapfrog, as each side scrambles to gain control of every possible free planet in the universe. Landing on an empty planet is sufficient to gain control of that planet. The difficult part of accomplishing that task is that the planets all have different orbits. For you to cross from one planet to another, the planets must be in the right conjunction. Otherwise the gravitational differential will prevent travel.

At the beginning of a turn, each planet under your control receives a fresh allotment of ships. Then when an entire star system is under control, bonus ships are awarded based upon the number of planets conquered. Therefore, the systems with the most planets are the most important militarily and economically. These are the systems that you should defend the most. In fact, proper defense is one of the most important factors in winning *Conquering Worlds*.

Just when you are having a great time empire-building, the robot fleets will start to descend upon your outer star systems. Your sphere of influence has just collided with theirs! Unless quick countermeasures are taken, star system after star system will fall before their onslaught.

While *Conquering Worlds* is basically a strategy game, it also contains a simple arcade game. When the battle is joined with the robot fleets, the arcade game begins. Twin lasers move up and down the side of the screen firing, while enemy ships buzz around the screen like flies in a bottle. Each side gets a fixed time to eliminate as many opponents as possible. This battling continues until one side is vanquished. The main game is over when either all the worlds are conquered or all the enemies are destroyed.

Conquering Worlds is somewhat difficult to learn because the gaming system is clumsy in spots. Also, the manual is woefully inadequate in explaining how to do different things.

Once the game is mastered, though, it is enjoyable and challenging. The computer is a worthy opponent, and it's deadly in the arcade rounds. When you have star wars in mind, *Conquering Worlds* might be your type of challenge. RRA

Conquering Worlds, by Walter Hochbrueckner, Datamost (8943 Fullbright Avenue, Chatsworth, CA 91311; 213-709-1202). $39.95.

Mission: Escape! By Thomas Schumann. "It seems that we have met like this before. . . ." The setting is space, the circumstance a rescue mission. The player half of us is a shuttlecraft pilot who must risk life and limb through streams of meteors, comets (small variety), and UFOs that are jeopardizing the very universe of the (good grief) Tweenies, inhabitants of a solar system of twelve planets called the . . . you really don't want to know.

Tweenies obviously enjoy solitude; there's a population of precisely six shiploads per planet. These you must shuttle to your extremely uncooperative—or simply incompetent—mothership. The trip from mom to planet is pretty much a dodging game, and landing properly is no hassle. But as soon as you begin ascending with your twitchy Tweenie, your mothership apparently begins moving to meet you; only she passes right by you, back and forth from one side of the screen to the other, and she's not forgiving at all, making it frustrating as all get-out to dock.

On the way back you can shoot to disperse the rocks; of course, that doesn't help a whit with your recalcitrant mother. Shooting the rocks does score points, so it's possible to be distracted from your mission of mercy, which has nothing to do with getting even with the rocks. But, then, Tweenies aren't nearly as cute as little hostages, and they don't wave.

Eventually, you must travel to all twelve planets, and the going gets rougher. Additional shuttlecrafts are a bonus for good scoring. There's no such thing as an old shuttlecraft in the Tweenies' end of the galaxy, folks; you're not apt to put very many miles on any particular ship.

The graphics are okay, and so is the game. It's not one you play once and put away; it's enjoyable for some time—regardless of whether you ever make it back from the twelfth planet—while you develop your piloting skills, timing, strategy, and patience.

On the other hand, if you've had your Apple from day one, you've probably run into half a dozen of this game's siblings, though you can't remember where or when. LXB

Mission:Escape, by Thomas Schumann, MicroSparc (10 Lewis Street, Lincoln, MA 01773; 617-259-9710). $29.95.

Pen-Pal. By Chris and Ann Moller. Here is a small and friendly word processor. This is not one of your towering giants like *WordStar*. It doesn't do every job in a writer's office, but *Pen-Pal* has made that more of a strength than a weakness. It has everything you'll likely need for

manuscripts or correspondence, and one thing more: As the name suggests, it's comfortable to work with.

Pen-Pal lets you enter text in the usual way, as if from a typewriter. For making corrections, you can move the cursor around with control-key commands to add or delete individual characters; or you can go into "command mode" and change whole blocks of text. When you type control-A, the prompt "CMD" appears on-screen, and the system waits for instructions instead of text. In this mode, you can add or delete (or move, copy, or store on disk) a whole block of text, previously marked. *Pen-Pal* also allows you to include formatting commands in the text: They will not be printed but will change the margins (or the spacing, or whatever) at a particular point in the document.

The system works in either forty or eighty columns. If you don't have an eighty-column card, you can choose between two different displays: think mode and look mode. Think mode is for text entry. It shows you the complete text in forty-column format, with carriage returns and justification marks shown in inverse. Look mode is for checking the final version: It shows you the text as it will be printed. You can see only part of the page at a time, since you are looking through the screen, which isn't as wide as the page. However, you can easily move the window around the document with CMD keys or a joystick, so that's no problem.

When you're satisfied with the text in look mode, you can print it using the CMD mode. Unlike many word processors, *Pen-Pal* doesn't require you to load a separate print program: The print command is part of text entry. Incidentally, this makes *Pen-Pal* a good choice if you have only one disk drive. You have to change disks only at the beginning of a session: when you take out the program disk and put in the data disk. For that matter, it's also a good choice if you have six or eight drives: It's easy to change both slot and drive numbers from within the program.

This program is particularly gentle to the beginner; it has a lot of help available. There are five different tutorial screens listing the various commands and describing their functions. These are available at any time by simply going into CMD mode and typing the number of the screen you want. In addition, the program comes with three reference cards showing the various CMD and control-key functions. The cards show the commands pictorially and in table form for both the IIe and II Plus keyboards. With that kind of help, it's hard to get lost, but if you do, the publisher maintains a toll-free phone number to assist you.

This system can also act as an editor for Applesoft programs, letting you apply all the capabilities of the word processor to writing your own software. Your program must be converted into a text file before the editor can read it, but *Pen-Pal* includes a short program for that conversion that is automatically added to every data disk during initialization.

The system disk is copyable, so if catastrophe strikes you won't lose the system.

If you have been putting off getting a word processor because you thought the good ones were too complicated or too expensive, you should try writing a letter to a *Pen-Pal*. JR

Pen-Pal, by Chris and Ann Moller, Howard W. Sams & Company (4300 West Sixty-second Street, Indianapolis, IN 46268; 800-348-8558). $59.95.

Sargon III. By Dan and Kathe Spracklen. There are some people you just can't keep down. The Spracklen team from San Diego certainly falls into that category.

For those who've been word processing or zapping aliens and therefore not paying attention to the rest of the world, the Spracklens are the premier authors of microcomputer chess programs. Their *Sargon* series has reigned supreme practically since the dawn of the microcomputer and they've either written or influenced most of the dedicated chess programs on the market.

But recently *Sargon* had fallen on hard times. Upstart Larry Atkin downloaded and rewrote a mainframe chess program that goes by the name of *Chess 7.0* on the Apple and it clearly stole the march from *Sargon II*. *Sargon II* continued to sell well, but *Chess 7.0* was the elegant program.

Sargon II had an Achilles' heel that had to do with the tradeoff between speed and power. It could play bad chess fast or superior chess at a snail's pace. For the real chess aficionado, *Sargon*'s lower levels were too easy and its upper levels too slow. *Chess 7.0*, with fast response and a better game at the lower levels, seemed destined to eventually unseat the king.

It now appears that *Chess 7.0* has its work cut out for it. *Sargon III* rectifies the problems of *Sargon II* and adds palatable feature after palatable feature to the basic program.

But the salient point is that *Sargon III* plays good chess fast. No more dozing while *Sargon* contemplates its ROM chips in Buddha-like serenity. This *Sargon* is quick-thinking and brash. Like its forebears, this version is stronger at fundamentally sound positional chess than at brilliant maneuvers that can turn a game around. Of course, that's the same faint praise with which the Russian grandmasters who dominate international chess are generally damned.

Two of the major enhancements in this version are in the recognition of time and in the continued functioning of the program.

Sargon III allots itself a time budget based on the level of play chosen, and it moves within that constraint. Thus, as in matches between humans, if it plays too slowly early on, it must hustle later—perhaps to its detriment. On the other hand, if it is able to use its extensive library of chess openings for several quick moves, it conserves time for later. This feature allows the user to simulate real chess tournament action—clock and all.

Equally as important is the fact that *Sargon III* doesn't sit in an idle mode while you contemplate your next move. It continues to analyze the position, just as a human would, and is therefore better prepared to respond to its opponent's sallies.

But playing good chess is just the beginning for this version of *Sargon*. There are one hundred seven classic games of the past on a separate disk that can be replayed for either instruction or entertainment. These games were chosen by life master Boris Baczynskyj and represent an excellent compendium of classic games as well as lesser-known contests that contain excellent lessons.

Baczynskyj also annotates a series of chess problems that are well chosen to highlight problem areas common to many chess players. The problems are interesting and challenging and add significant depth to the overall package.

Just the fact that *Sargon III* plays faster would be enough for many of the dedicated *Sargon* fans. But the extra added attractions figure to make this version irresistible. ART

Sargon III, by Dan and Kathe Spracklen, Hayden Software (600 Suffolk Street, Lowell, MA 01853; 800-343-1218). $49.95.

The Spy Strikes Back (or *How To Not Be Seen*). By Robert Hardy and Mark Pelczarski. The adventures of James Bond, secret agent 007 on Her Majesty's Secret Service, have provided moviegoers with vicarious thrills for two decades. Although they aren't considered high drama by anyone, and some Bond films are better than others, the series as a whole has demonstrated that a sequel need not be a second-rate effort that exploits the success of its predecessors.

So it is with *The Spy Strikes Back*. In fact, this new Penguin offering is considerably better than the earlier *Spy's Demise*. It may even be the best arcade game Penguin has published to date.

This new spy thriller has elements of adventure, and, although it's certainly not the first game to flirt with the boundary between genres, it does so in a unique way. Playing on the arcade level, you must guide the same spy used in *Spy's Demise* (truly a masterpiece of packing a lot of character into only a few pixels) through a grid of corridors similar in appearance to the *Crossfire* playing screen. Each screen includes sixteen rooms. The corridors are patrolled by splendidly animated robotlike guards who travel in a random search pattern until they see you. When one of them does, they all attempt to catch you and blow up in your face. You can duck into a room to escape them and they'll soon forget you were there.

Surprisingly enough, your goal is not to kill these robots. In fact, you have no way to kill them. Points are acquired by surviving long enough to move on to the next screen. It's important not to be killed, but it's also important not to be seen: Each time you're spotted, the number of points you'll get for completing that level is cut in half. You can also pick up bonus points by getting objects hidden in the rooms, but these are peripheral to the main theme.

The object of the game is really more adventuresome than that. There are 120 screens in the game, existing in a building that has five floors, each floor being composed of a six-by-four array of playing screens. Each screen has a flashing object that you must retrieve before you can proceed to the next screen on that floor. When you get the object, you are offered a way out. The trick is you are offered a way out in one direction only! Some screens also have an elevator to the floor above or below, so there are at most two exits from any screen. You'll find, as you move

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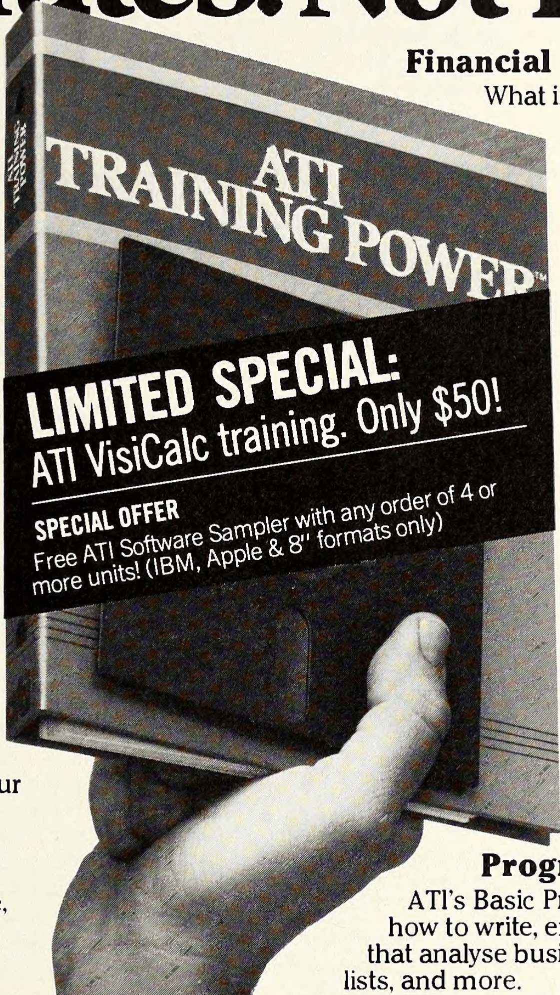

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from screen to screen, that you have to make a map if you expect to get any place but lost.

There is good reason to know where you are. On nine of the one hundred twenty screens there is a contact waiting to give you a clue. The nine clues are in code. Your mission, should you decide to accept it, is to get all the clues and crack the code. This isn't a trivial task. First of all, you will be given the clues in the same order each time you play the game no matter which contacts you go to. This means that you have to get all nine clues in the same game; you can't get five clues, get killed, and then play again to get the other four. Also, the clues come in the form of colors and musical tones. It's not a simple cipher to crack.

If you succeed in translating the message and are the first in your state, Canadian province, or foreign country to do so, Penguin will award you a $100 gift certificate. In Penguin money (which, as we know, is a deflated form of U.S. currency) that's five games.

As a nice bonus, if you have a Mockingboard, *The Spy Strikes Back* puts it to good use. The security robots are kind enough to tell you when they see you, the explosions are more convincing, and the coded tones are more musical. Penguin's *Spy* games seem to follow the Bond films' pattern of becoming progressively more impressive technically. Which raises an interesting question: Will there be more *Spy* games? If this one is a success, Penguin may decide to take a lesson from Sean Connery: Never say never again! DD

The Spy Strikes Back (or *How To Not Be Seen*), by Robert Hardy and Mark Pelczarski, Penguin Software (830 Fourth Avenue, Geneva, IL 60134; 312-232-1984). $19.95.

Zoo Master. By Kevin Ryan. Several years ago, a young company of highly principled people with a strong aversion to violence put out a game with the theme of catching stray animals from the zoo. With a dozen screens (or so it seemed) of no-punches-held philosophy to wade through before playing, the game didn't rise high on the charts. The company soon learned to save the speeches for those who asked for them and went on to become the successful Avant-Garde. Somewhere along the way, their aversion to violence also fell by the wayside—not a great loss either, since most computer games that purport to be violent do not play as violence but as tests of skill.

Now another young company has released a game about catching stray animals from the zoo. True to its time, this game is more sophisticated than the infant Avant-Garde's game was. But, like many nonviolent games, *Zoo Master* plays as if it were as violent as any other game. The player must catch the birds (oddly none of which can fly), but dangerous animals must be trapped or tranquilized.

And how do you tranquilize a dangerous animal? You shoot it, of course, but only with a tranquilizer gun. But fear not that it might seem just like killing the beasts: Each fallen giraffe or tiger emits a line of peaceful little zzzzzs as it lies there. Comforting. And then there's the player, represented by a wee head in a little Jeep: Are the animals as kind to the player? Mais, non, zees ees realite—ze animals, zey do not know how to tranquilize—zey bite and maul and eat up, yum. Jeep and all.

Odd about reality, how the need for its presence or absence suits itself to the desired ends. Among the dangerous zoo animals are yeti that, because of their great size, can scale walls even birds can't fly over. That's a coup for any zoo. But the relentlessly pursuing yeti pep up the game, adding a frustration factor that actually reminds the player that his gun is a mere tranquilizer. On the yeti, patient is the person who doesn't wish it were a Magnum .44.

Well, the game needed the boost. But, once the decision to abandon reality is made, why stop? Thus another compromise: From time to time each animal wiggles itself into a different animal. And, occasionally, the screen shimmers for a second into negative and then a lot of animals metamorphose into—yuk—yeti.

From the standpoint of playability, the tradeoffs work. Without them, the game might suffer. With them, it's kind of fun. Also enhancing playability is the presence of a larger goal—artificial and just for fun; it also explains just how all the animals got loose. Blame it on (fanfare) the mad scientist. You know him. By the time the game begins, he's on the fifth level of the zoo, still happily uncaging critters at a fast pace. Capturing him can more than double an ordinary score. That's the main goal and a good one to go after directly when you're new to the game.

Later on, as you figure out strategies to avoid becoming a meal for a grizzly or a floormat for an elephant, you can go for high scores. A thoroughly nonviolent, challenging, and delightful means to a large bonus is to capture at least one each of the five kinds of birds, all on one level. Some situations seem impossible on first play, such as escaping at all when several animals become yeti and they're coming at you from different directions—and there are still your run-of-the-mill rhinoceroses, lethal snakes, and vicious "flying ducks" (other than these, are there ducks that don't fly?) to contend with. After a while, and after a few miraculous escapes, you realize that there might be a way to play your way out of these situations. The game has a lot more depth than meets the glancing eye.

Zoo Master is not very speedy, although quick thinking and fast action are called for. Youngsters and adults are apt to play it for different values. It's easy to imagine small kids totally absorbed by the game right away. Oldsters, say fifteen and up, may need to let it grow on them. But things that grow on you often last; *Zoo Master* shows promise of continuing to fascinate and frustrate its aficionados for a long time.

And remember, when the traps explode, when the gun goes off, when the leopard devours you, this is nonviolent.

Funny. Avant-Garde was from Oregon, too. MCT

Zoo Master, by Kevin Ryan, Earthware Computer Services (Box 30039, Eugene, OR 97403; 503-344-3383). $20.

Lancaster. By Will Harvey. Lately, it seems that the initial sales success of entertainment software has been based upon consumer response to slick packaging. Boxes are in vogue, while flat, cardboard-backed plastic envelopes seem passe. Marketing mavens have lost jobs (and sometimes vital organs) due to miscalculations concerning what attracts a buyer to a product. For example, the incorrect use of package colors or a lackluster title can spell doom for an otherwise exciting game. And documentation that reads as though it were penned by a Ukrainian bear keeper will often ring the game's death knell.

To get along with *Lancaster*, you must overcome these prejudices. Ignore *Lancaster*'s title, put aside the dull packaging, and burn the documentation after the first reading. Silicon Valley Systems's second entry into the arcade game market revolves around exciting play and fine graphics. Surprise!

The scenario is of the overused threat-to-Earth variety, but the game's execution is excellent. Alien creatures resembling bugs try to conquer your planet by blowing bubbles—colorful bubbles. Bouncy bubbles that rebound all around the playing area—deadly bubbles! For inside each fragile blister reside three larvae that grow into adult insects. As larvae, the insects are indestructible and should be avoided at all costs, but once they reach adulthood they should be destroyed—quickly. If allowed to survive, these renegades from a Roach Motel create more larvae-infested bubbles that in turn produce more menacing insects. Therefore, the player's odds for a long and fruitful life shrink alarmingly with each colorful cocoon.

The bubbles sport a spectrum of color. A bar of colors also runs along the bottom of the screen. Should a bubble and bar of identical color meet, the bar portion disappears from view and additional points are added to the player's score. Should the player erase all of the bars, an extra ship and bonus points are awarded.

Players start out with five ships that can move vertically and horizontally and can be controlled by either a keyboard or joystick. Button 1 activates the pincers along a ship's base that are used to lift a bubble to a new location. This is done to drop the bubble on a bar of the same color, move a potentially lethal object out of harm's way, or seize a bouncing bubble. Should the last prove successful, the player garners additional points.

Allow a bug, bubble, or larva to strike and one ship is destroyed. Should matters go poorly, you can use a smart bomb to cause everything but larvae to evaporate immediately. Unfortunately, only three such deterrents are available for each game. The bottom of the screen reveals the current score and number of ships remaining to the player.

When the player has lost all five ships, the high-score screen appears. Both high scores for the day and scores to date are shown. For some reason, the author found it necessary to instigate a slow signature scrawl onscreen, which can be aggravating if a player wants to return to the game immediately. To speed things up, strike any key and begin a new game.

Addictive play, sophisticated movement, bright color, and arcadelike quality all prove that, in *Lancaster*'s case, the old cliche holds true—you really can't tell a book by its cover. HL

Lancaster, by Will Harvey, Silicon Valley Systems (1625 El Camino Real, Belmont, CA 94002; 415-593-4344). $29.95.

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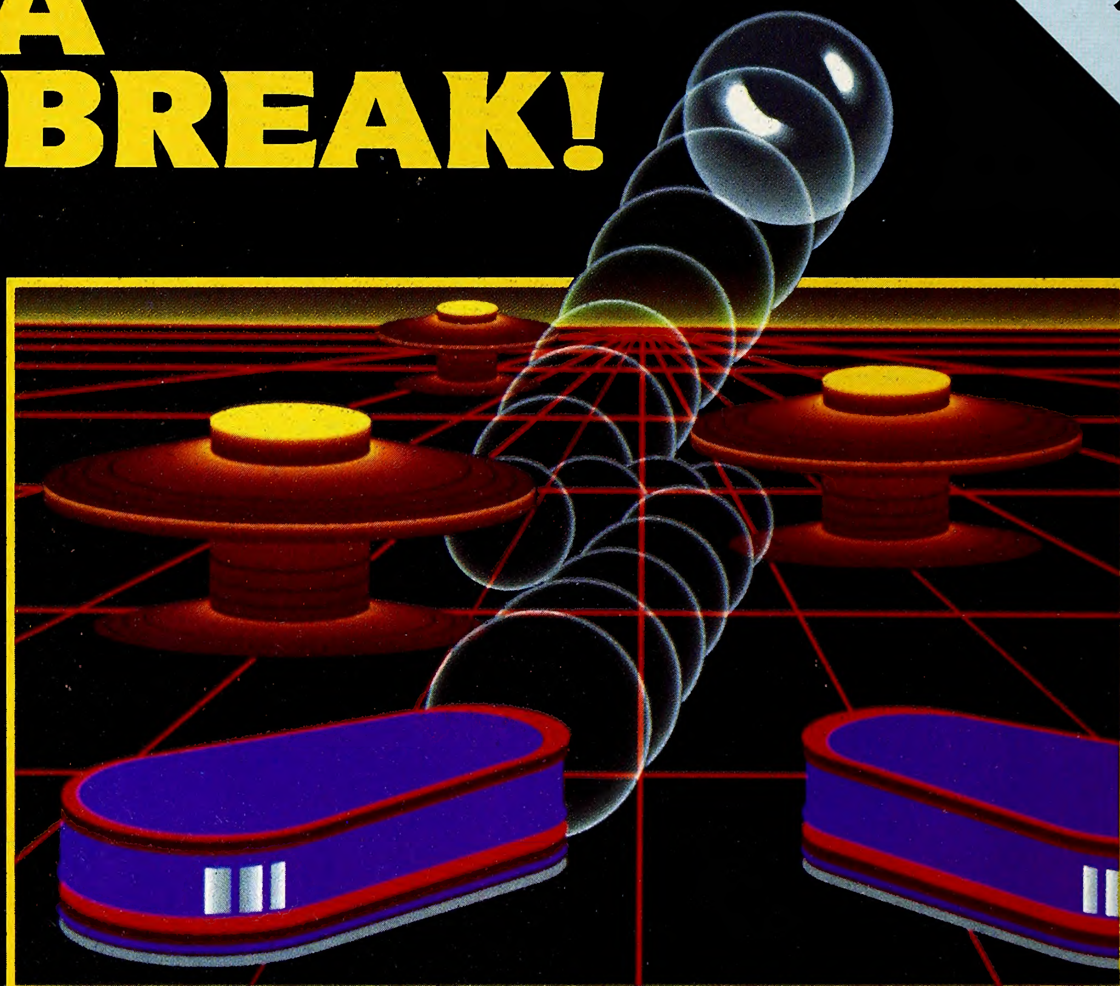

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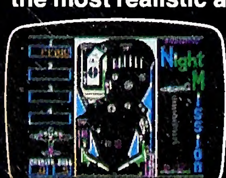

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Have you ever had the feeling that you're running and running and just not getting anyplace? Usually it's a feeling related to, and sometimes a necessary part of, getting work done. We use different terms to describe this experience—we call it the rat race, the treadmill, going around in circles, and so on. Well, *mirabile dictu*, the computer is capable of just such behavior, and it doesn't even mind. (It doesn't have a mind to, you could say.) By programming the computer properly, we can have most of the advantages the treadmill offers—and there must be a desirable end product in there someplace or we wouldn't have put up with this situation all these centuries—without having to run it ourselves.

Go with the Flow. Last month we summarized some of the things a computer can do for us. We said that it's good at any information work that is repetitive, time-consuming, dull, or all of the above. A key word is *repetitive*. One of the agents—indeed, you could say an unquestioning workhorse of all this repetitive activity you're going to instruct your Apple to perform—is the *goto* command.

Goto is one way to get around in an Applesoft program. Remember when we talked about flow charts? Last month's chart had a number of loops in it: places where the arrows and lines indicated that the computer should return to a previously executed part of the program. Those lines indicated *flow of control*. You see, the Apple can execute only one command at a time. Normally, when it is finished with one command, it moves on to the next one in sequence. In some cases, however, a command tells the computer to continue its operations elsewhere. The simplest of the several commands that do this is goto. By the way, that isn't a typo. In English, it would be *go to*, but in Applesoft it's treated as one word.

All we lack is a way to tell the computer where to goto (or maybe, where to goto to?). For this we use line numbers. You'll recall from last time that line numbers tell the computer where to put a line in the program when you're writing it. Another major purpose that line numbers serve is to index the lines so that you have a way to tell the computer to loop back to a specific one.

Let's put this new knowledge to use. Fire up your Apple the way we talked about last time, and when you have the Applesoft prompt (]) and the blinking cursor, type *new* to clear the Apple's memory of any previous programs. (You may wonder how a program might have gotten there if you just turned the computer on. The assumption is that you booted up with your System Master or another disk. Most disks that operate under DOS have a program on them that runs automatically when you boot the disk. This is called a *hello program*.)

A Scholarly Example. So, on to a quick program of our own. One of the repetitive tasks that most schoolkids are called upon to perform at some time before reaching junior high is the writing of something one hundred times, or until their arms fall off. Teachers in the future are going to have to think of something more imaginative, because pretty soon some smart kid is going to write this program, run it, and have the output printed in triplicate: one copy for the teacher, one for the parents, and one for the Society for the Prevention of Cruelty to Children. The program looks like this:

```
10  HOME
20  PRINT "I will not shoot spitballs in class again."
30  GOTO 20
```

Go ahead and type it in, then run it. Notice that the commands home, print, and goto are all in capital letters, while the message in quotes is in mixed upper and lower case. If you have an Apple II or II Plus, you'll have to type the whole thing in capitals, because your computer has no provision for input or display in lower case (barring certain possible hardware modifications that we won't go into here).

If you have a IIe, you can use both upper and lower case, but in a few ways you have more responsibilities than those who lack that flexibility. First of all, Applesoft and DOS commands have to be entered in upper case, so if you want to switch to lower case for material to be printed, as shown in this program, you have to remember to set the caps-lock key again when you've typed the stuff within the quotes. Another thing to remember is that, if you want to write programs that will run on Apples other than your own, you have to consider that some of those machines won't be able to display lower case. If this bothers you at all, set the caps-lock key and leave it on for now.

If you ran that program when you were asked to, you may have noticed while you were reading the last paragraph that your Apple was busily doing penance for your sins. In fact, it probably finished writing the sentence a hundred times quite a while ago, but it's continuing tirelessly nevertheless. What a workhorse! The Apple is in what's called an *infinite loop*—that is, a situation in which it will just keep on doing the same thing over and over again. Let's tell it to stop and then look at how it got into this ridiculous situation.

Stop the Presses! Normally, you can't give commands to the Apple while it's busy doing something else. There's one command, however, that Applesoft will pay attention to at any time. Hold down the control key and hit the C key. This is called "hitting control-C," and it means, "Stop!" This isn't the kind of command you'd put into a program (even if you could), but it comes in handy when you're debugging a program.

It should be fairly obvious how we got stuck in an infinite loop. Line 30 told the computer to go back to a previous command. When the computer returned to line 30, it did the same thing again. And it kept on doing it until we forced it to stop with control-C. Figure 1 shows a flow chart of this program, which should clarify what happened.

What we need is a way of counting how many times our message has been written and stopping when we've printed it one hundred times. We have just the command; it's called *if-then*. Before we can use if-then, however, we have to know something about *variables*. Variables are another kind of word in the Applesoft sentence. They are used to store data to be used in a program later on. There are three types of variables: real, integer, and string. The first two are different types of numeric variables—variables for holding numbers. The last one is for holding

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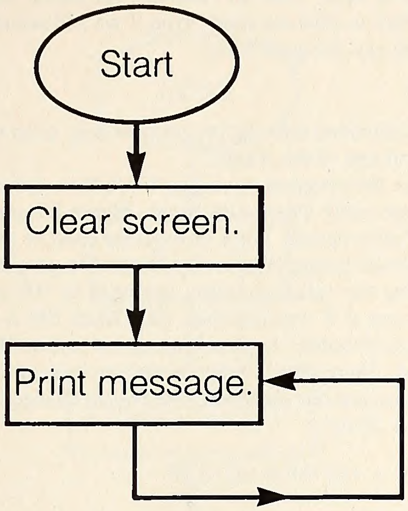

Figure 1.

alphanumeric data: names, dates, and so on. We'll look only at real variables this time.

Real numbers differ from integers in that integers have no decimal places while reals may or may not have decimal places. So 2, −9, and 103 are both reals and integers, while 3.14159, 98.6, and −0.003 are only reals. Because the decimal point can fall anyplace within a real number, reals are also called floating point numbers. Applesoft is also called Floating Point Basic (hence the name of this column) to distinguish it from the older Integer Basic. (Floating Point Basic may seem a bit long-winded, but Real Basic was probably rejected as too pretentious.)

Anyway, real variables are those that can hold real numbers. Applesoft interprets as a variable anything in a program that begins with a letter, consists solely of letters and numbers, isn't contained in quotes, and doesn't contain any command names. Applesoft sets up space for variables while it's running a program. If a variable is in a place in a statement where a variable or some such expression is expected, so much the better. Applesoft will deal with the variable as called for and continue to run the program. If something isn't in a syntactically correct place for a variable, Applesoft will still think it's a variable when you type the line in but will throw the case out of court when you try to run the program.

A Safe Deposit Box To Keep Your Values In. What does all this mean to you? If you have a number you want to keep track of for later use in the program, make up a variable name and tell the computer that the variable equals that number. You may tell it to change the value of the variable later on, which is why we call them variables.

For now, let's stick to one-letter variable names to avoid confusion (meaning to avoid going into a lot of rules this early in the game). What our program needs is a counting variable. Let's start out by telling the program that this variable exists and what it is worth. Add this line:

```
5  LET X = 1
```

Not worth much, is it? Worry not, it will come to be worth much more. Now throw in this line:

```
25  LET X = X + 1
```

Lines 5 and 25 assign values to X. In the first case, the value 1 is given to the variable. This means that whenever we say X in the future, we mean 1, unless we are telling the computer to let X equal something else. In line 25, for instance, the expression X + 1 is evaluated to mean 1 + 1, or 2, so the variable X comes to mean 2. Since a variable can hold only one value at a time, X now forgets that it ever meant 1 and is prepared to go through life meaning 2, as if that were all it had ever meant.

Something like an Identity Crisis. However, since line 30 still sends us back to line 20, and line 25 follows line 20 sure as a street sweeper follows a ticker-tape parade, the next time through the loop, X will be told to equal X + 1, or 2 + 1, and it will suddenly think of itself as 3.

(By the way, the word *let* in lines 5 and 25 is optional, but it serves to remind die-hard algebra students not to use the phrase X = X + 1 to prove that 1 = 0. Once you've fully accepted that 1 = 1 and 0 = 0, you can omit the word let in such statements.)

So we can see the variable doing its thing, let's change line 20 (the easiest way to do this is to retype the line):

```
20  PRINT X; "  I will not shoot spitballs in class again."
```

This way, the counting number—the value of X—will be printed before each repetition of the sentence. The semicolon separating the X from the sentence in quotes tells Applesoft not to put any spaces between the value of X and the first character in quotes. However, we also put two leading spaces between the opening quote and the start of the sentence so that the number will not run into the sentence. Run the program.

You'll see that each time the sentence is printed, it is preceded by a number. But we still have an infinite loop, because we aren't acting on that number. Anybody remember if-then? Good. If-then works like this: The command *if* is followed by a condition like one of these:

```
X = 5
X > = Y - 3
(X + 5) * 2 <> Z / 100
```

These conditions mean X equals 5, X is greater than or equal to the difference Y − 3, and the sum X + 5 multiplied by 2 is not equal to Z divided by 100 respectively. In an if-then statement, the condition is followed immediately by the word *then* and any Applesoft command. If the condition is true when the statement is executed, the command following *then* will be executed. If not, Applesoft looks for the next line of the program and executes it. The line that should serve our purposes is:

```
30  IF X < 100 THEN GOTO 20
```

Let's add a line at the end for the flow of control to fall back on when the condition is false. This isn't entirely necessary, as the program will just stop, which is what we want, even if we add nothing to the end. But let's do it anyway for good form.

```
40  END
```

The *end* command tells the program to stop, even if end isn't located at the physical end of the listing.

If you run the program now, you'll see that, unfortunately, it prints out the sentence only ninety-nine times. Figure 2 is the flow chart of the newly modified program. Trace through the chart or list the program and trace through the listing (that is, try to run the program in your mind). You'll see that the value of X was increased to 100 and then the check was made to see if X was less than 100. Since 100 is not less than 100, the test in line 30 failed, Applesoft advanced to line 40, end, so the program stopped. There are a couple of ways to make the program work as desired. The easiest one (involving the fewest changes to the program) is to change line 30 to:

```
30  IF X < = 100 THEN GOTO 20
```

This works because 100 is less than *or equal to* 100. Think about it. You should be able to come up with at least one other way to solve the problem. Hint: You can put the print statement after the line that increments the value of X. And don't jump up and say you know the answer until you've tried it and know it works, because the answer contains other traps to fall into. Solving puzzles like this is what programming is all about.

Downshift into Second. It isn't easy to cover all the facts and stay on one coherent course of instruction at the same time: Too many digressions can make the larger picture harder to see. This is a good time to look at some details that we've glossed over so far. The first of these shall be, arbitrarily, arithmetic expressions.

An expression is a series of numbers, variables, arithmetic operators, and functions put together in such a way that the computer can evaluate

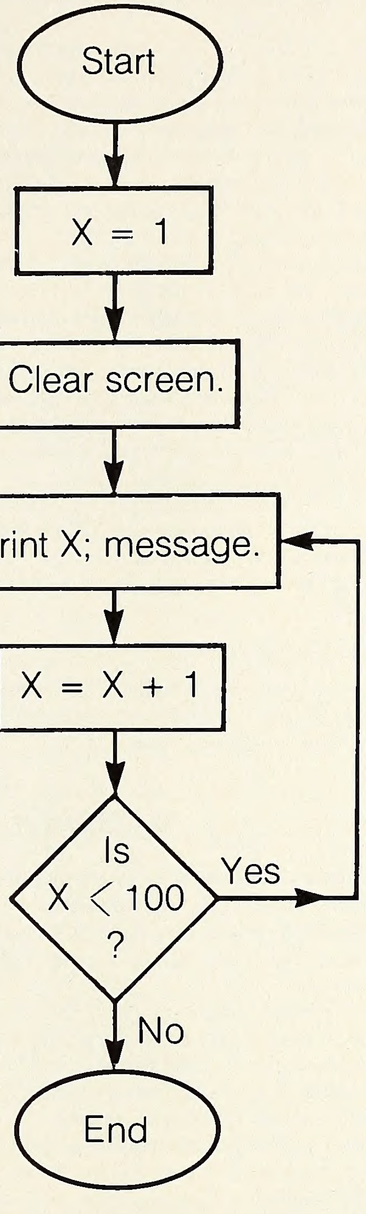

Figure 2.

them—that is, simplify them—to a single value. So far, we've seen these expressions in let statements and in if-then statements. Of the commands we've looked at so far, expressions can also appear in print statements.

We'll continue to ignore functions for the time being, and you should already have a sufficient familiarity with numbers and variables. The *operators* that can appear in arithmetic expressions are the symbols +, –, *, /, and ∧ . The first two are self-explanatory. The asterisk (*) indicates multiplication, the slash (/) means division, and the caret (∧) represents exponents. In addition (also in subtraction, multiplication, and so on, if you'll pardon the pun), parentheses can be used to tell the computer which operations to perform first in evaluating an expression. Figure 3 shows each of the five Basic operators used in expressions; the way they would appear in standard mathematical notation is displayed alongside them.

Formally speaking, a let statement has a single variable on the left of the equal sign and an expression on the right. The expression can be as simple as a single variable or number, or it can be extremely complicated. When the expression is evaluated, the resulting value replaces the previous value of the variable that appears on the left of the equal sign. Remember that that variable can be used as part of the expression on the right, which is useful for incrementing loops, as we have seen.

An if-then statement may superficially resemble a let statement, but there are two other *relational operators*—symbols indicating a comparison of values—in addition to the equal sign; they are > and < , meaning greater than and less than. As shown in the latest version of line 30, relational operators can be used singly or in pairs. When a pair is used, it acts as a single operator, but it means either one or the other is true. In other words, > = or = < means "is greater than or equal to." Inequality is expressed by <> or >< , meaning literally, "is greater than or less than." An if-then statement may have simple or complex expressions on both sides of the operator.

The print statement is a little more complex than we presented here. We know it consists of the word *print* and something to be printed. The material to be printed can be any number of numbers, variables, expressions, and strings, limited only by Applesoft's 239-character line input length. (*String*, by the way, is the term for words, sentences, and other sets of characters appearing between quotes.) A print statement followed by nothing causes a blank line to be printed.

If you use semicolons to separate the elements of a print statement, each element will print where the last one left off. This is true even if you end a print statement with a semicolon. The first character printed by the next print statement will appear immediately after the last character printed.

If you use a comma instead of a semicolon, the next element printed will line up in predefined columns. These columns are kind of like tab settings on a typewriter, except that the programmer has no control over them. Applesoft uses columns 1, 17, and 33 as its tab settings. There are more flexible ways to assign columns to tabular printed data, so the comma is used in print statements only when three columns is sufficient.

Guess Your Wait. Next month we're going to create a simple random number guessing game, but there's no reason you shouldn't get a head start. Such a game should select a random number, ask for the user's guess, say whether the guess is high, low, or correct, and either end the game or let the user guess again. Beyond that, you can make your program as fancy as you like. You'll need two new commands in addition to the ones you already know. The first is *input*. This command is another way of assigning a value to a variable, but instead of assigning the value from within the program, input asks the user for the value. Use the following line to solicit the user's guess:

```
100  INPUT "What is your guess? ";G
```

The string between the quotes acts as the prompt, and G is the variable Applesoft will put the answer in.

Now the random number to be guessed is generated using two functions, like so:

```
110  LET R = INT( RND( 1) * 10) + 1
```

This line generates a random integer between one and ten and stores it in the variable R. We'll explain what INT and RND mean as well as how the whole thing works next time.

Basic	Math
X + 5	X + 5
Y − 2	Y − 2
A * B	A × B
5 / 100	$\frac{5}{100}$
2 ∧ 6	2^6

Figure 3.

GLOSSARY

Arithmetic operator: Any of the symbols +, −, *, /, and ∧ . Represents an arithmetic operation.

Control-C: A command to Applesoft issued by holding down the control key while typing C. Interrupts a running Applesoft program.

END: Applesoft command to end the execution of a program. If this command isn't used, the program will end upon reaching the physical end of the listing.

Expression: A series of numbers, variables, arithmetic operators, and functions that can be evaluated to a single value. Parentheses may be used to indicate precedence of operation.

Flow of control: The path Applesoft follows through a program while running it.

GOTO: Applesoft command to go to a different part of the program, indicated by the line number, and continue execution from there.

Hello program: The Applesoft or Integer Basic program on disk that DOS has been instructed to run when the disk is booted. Often the file is named Hello.

IF-THEN: An instruction to Applesoft to execute the command or commands following *then* if and only if the condition between *if* and *then* is true.

Infinite loop: A situation in which a program will run the same section of code repeatedly. An infinite loop in an Applesoft program may be exited by hitting control-C.

INPUT: Applesoft command for getting data from the keyboard and putting it into a variable or variables.

INT: The integer function.

LET: Applesoft command to assign a value to a variable.

Relational operator: Any of the symbols < , > , and =. Used to indicate a comparison between the values of two expressions. May be used in pairs.

RND: The random number function.

String: A series of characters.

Variable: A letter or series of letters and numbers in an Applesoft program that represents a number or string. A kind of "word" in the Applesoft "sentence."

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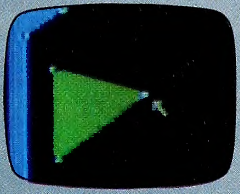

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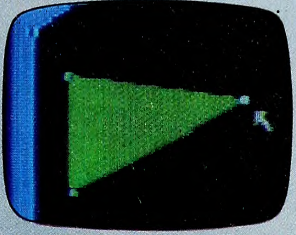

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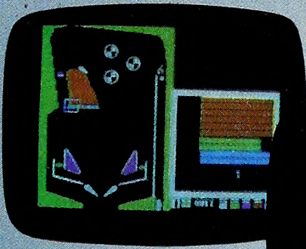

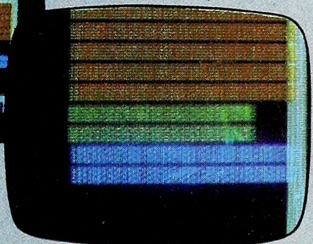

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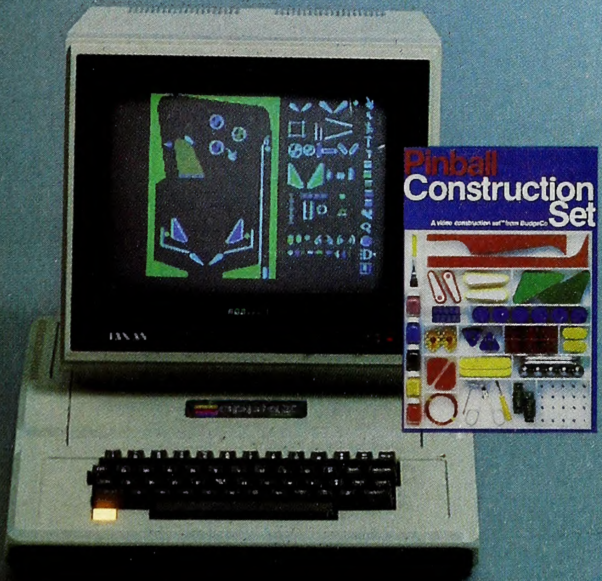

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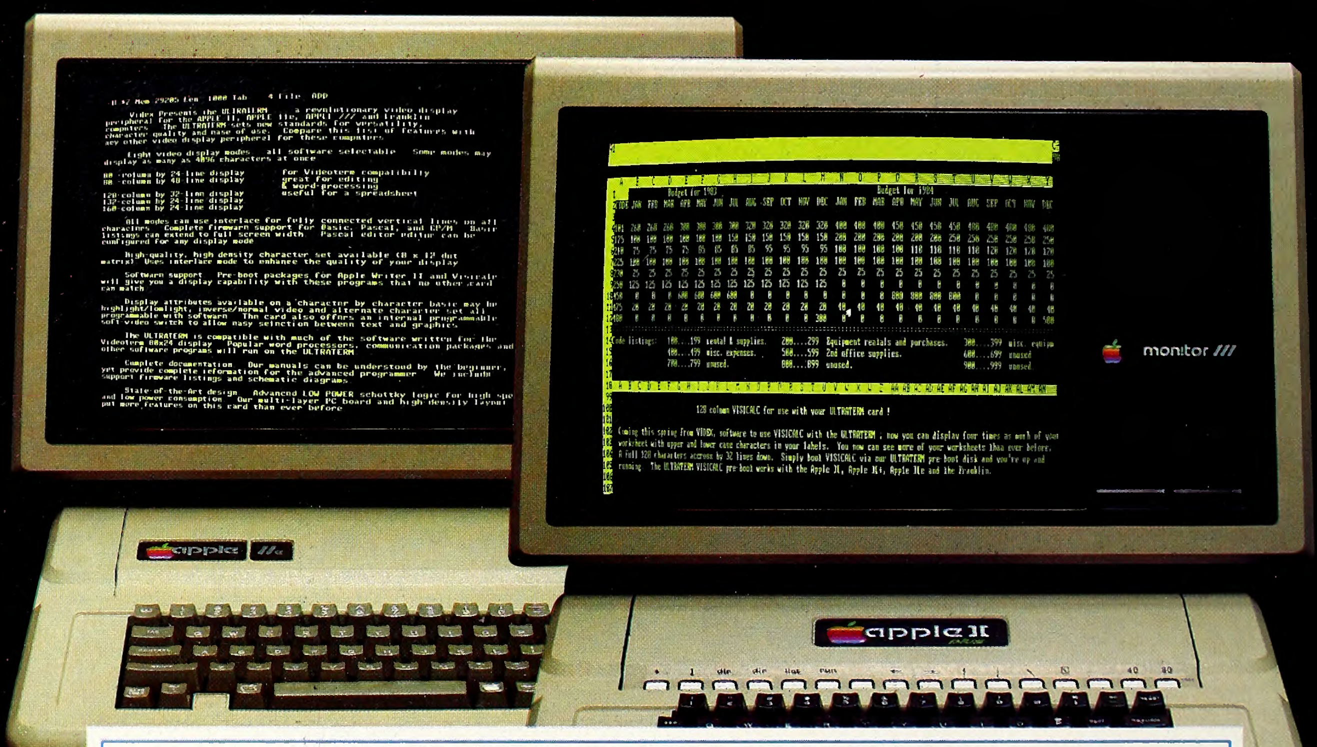

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VENTURES WITH VISICALC

BY JOE SHELTON

Last month we completed a template on the cost of borrowing money. As we mentioned then, *VisiCalc Advanced Version* users may want to modify that template to take advantage of some *Advanced Version* features. This month we'll undertake those modifications. Of course, as regular readers know, doing this will involve solving a problem. No free lunches here. If you don't have the finished template from last month, don't despair; you can still follow along with what we're going to do here.

Those of you who are using the regular *VisiCalc* will have another opportunity later on in the column. It's no free lunch either; once again, there's a problem to solve. Stay tuned.

@LABEL. The template we constructed last month began with September and continued through the following August (figure 1 shows the skeleton of that template; the formulas are not important for this discussion). If the loan you'd like to chart begins in a different month, you have a couple of options. One is to replace month titles with numbers so that you'll only have to deal in numbers when working with months. Meanwhile, *Advanced Version* provides a way of having the correct month's titles displayed, no matter which month you start in. But, as you might have guessed, setting things up this way takes a little doing. Let's see. . . .

By now you realize that we're going to use the *Advanced Version* function @LABEL. @LABEL is a sneaky way to turn text into something *VisiCalc* thinks is a value. And that means you can now have *VisiCalc*'s other functions display text as well as values.

Let's look at an example of how this capability works. Choose a cell outside the template area, say X1, and enter your name. In the cell below the first one (X2), enter @LABEL(X1) and press return.

Your name should now be displayed in the second cell. Next, enter some other text in X1 and press return. Notice that whatever text you entered is now displayed in X2. In other words, @LABEL can be used to display names, dates, or other information that must appear in different parts of a template.

@LABEL can also be used to display information related to a computation. If you were doing a stock portfolio analysis, for example, you could set up the @LABEL function to display the label SELL when some ratio of a company falls below a certain point. Instead of having to pick out undesirable ratios, you'd be letting *VisiCalc* "talk" to you. All you'd have to do to make this happen would be to specify that the result to be displayed from an @IF logic function be the @LABEL function instead of a value.

Do you see now how we might use @LABEL to solve our problem? Enter labels for the months January through December in cells B35 through B46, as shown in figure 2.

The area shown in figure 2 is the text table from which our labels will be displayed. Next we want to replace the month titles (September through August) in B15 through B26 with formulas that will result in the display of the appropriate months. One way to go would be to enter @LABEL(B43) (September) in B15 and replicate it throughout column B. That would result in the correct month for our loan being displayed, but it wouldn't tell us how to choose the beginning month of a loan and have it show up correctly.

Suppose we were to place an entry field for the beginning month in D10, as shown in figure 3.

Before reading any further why not see if you can determine how to proceed?

All we need to do is to have the value in D10 select the first month from the table. The @CHOOSE function is an easy way of accomplishing that. The formula in B15 would read:

```
@LABEL(@CHOOSE(D10,B35...B46)).
```

Try it and notice the results. The @CHOOSE function uses the 1 in D10 and counts that number of entries down the month table; it should display January.

The next month would require that the value read in D10 be incremented from 1 to 2 so that the second month will be displayed. The formula in B16 would read:

```
@LABEL(@CHOOSE(D10+1,B35...B46))
```

The third month would require incrementing 1 to 3. The formula in B17 would read:

```
@LABEL(@CHOOSE(D10+2,B35...B46))
```

and so on.

You can see how undesirable having to enter twelve, much less forty-eight, more formulas would be. You couldn't simply replicate a formula; you'd have to enter a new value manually in each cell.

See if you can think of a strategy for solving this problem (there's at

	B	C	D	E	F	G	H
12			MONTHLY	APPLIED	TO	EXTRA	TOTAL
13		BALANCE	PAYMENT	INTEREST	PRINCIPAL	PAYMENT	PAYMENTS
14							
15	SEPTEMBER						
16	OCTOBER						
17	NOVEMBER						
18	DECEMBER						
19	JANUARY						
20	FEBRUARY						
21	MARCH						
22	APRIL						
23	MAY						
24	JUNE						
25	JULY						
26	AUGUST						

Figure 1.

	B
35	JANUARY
36	FEBRUARY
37	MARCH
38	APRIL
39	MAY
40	JUNE
41	JULY
42	AUGUST
43	SEPTEMBER
44	OCTOBER
45	NOVEMBER
46	DECEMBER

Figure 2.

	B	C	D
8			
9			
10	BEGINNING MONTH #		1
11			
12			
13			

Figure 3.

least one) before we look at an alternative.

You can use the @LOOKUP function to achieve the same results as you get by using @CHOOSE. The @LOOKUP function requires a little help, however. First, it takes the value in D10 and compares it against a table of incremental values. When it finds the value that matches the lookup value (for example, the value in D10), @LOOKUP displays that value in the column to the right of the lookup column (or, in the case of a row orientation, in the row below the lookup row). So we must enter appropriate values to the left of the months. Beginning in A35, enter 1 through 12 in column A. Your template should now resemble figure 4.

Using @LOOKUP, the formula in B15 would read:

@LABEL(@LOOKUP(D10,A35...A46)).

The next month's formula would again have to increment the D10 value, so @LOOKUP doesn't alleviate the problem of having to increment a value for each month after the first one. Is there a better approach?

There are a number of ways to solve our problem. The most obvious is to have a value in the same row as the formula that increments by 1 in each succeeding row. Then we enter a cell reference instead of a value.

This same solution can be used to solve the @CHOOSE problem we were just talking about. For example, cell A16 would contain a 1. If we decided to continue using the @LOOKUP function, the formula in B16 would be:

@LABEL(@LOOKUP(D10+A16,A35...A46)).

Cell A17 would contain +A16+1 and the formula in B17 would be:

@LABEL(@LOOKUP(D10+A17,A35...A46)).

You could replicate the formulas into A17 and B17 down the column, using relative and no change (relative, no change, no change), and see the appropriate results.

Now change the value in D10 to 5 (May) and see what happens. The results aren't what you might expect, but they're exactly what you should expect. Whether you use @LOOKUP or @CHOOSE, the month table we entered doesn't contain enough months. When @CHOOSE is used, the function will display NA once the value is greater than 12 (the end

	A	B
35	1	JANUARY
36	2	FEBRUARY
37	3	MARCH
38	4	APRIL
39	5	MAY
40	6	JUNE
41	7	JULY
42	8	AUGUST
43	9	SEPTEMBER
44	10	OCTOBER
45	11	NOVEMBER
46	12	DECEMBER

Figure 4.

of the month table). @LOOKUP, on the other hand, will continue to return the last value in the table—in this case, December.

How might we resolve this problem?

To begin with, we know that the problem lies in the fact that we have values that will continue to increment (months 21, 22, 23, and so on) and a table that will end with the twelfth entry. One obvious solution would be to enlarge the table. Thus, if you were dealing with a forty-eight-month loan, you'd need a table with sixty entries. Why sixty? Because you'd have to be able to start in any month, from January (month 1) to December (month 12), and continue for forty-eight more months. The worst case, then, would be 12 + 48 = 60—that's a lot of entries. There must be a better way. (There is.)

Another option would be to take the lookup values beside the months and change them to the correct values. That, too, would require more than twelve months. Or, you might factor the increment values in the formulas, or perhaps the formulas themselves. Say what? Well, you could look at each formula and decide whether the result it obtained is greater than twelve. If it isn't, return the value; if it is, subtract twelve from it. Then the value will be appropriate for the next year. (See any flaws in this logic? Think about the third year. If you subtract 12 from month 25, you get 13. We're back to the beginning; all values that follow are incorrect.)

So now we're in a quandary. We don't seem any closer to a solution than we were before. So, the next step is to start with what we know.

First, we know that when we just use @LABEL, any month values beyond 12 require a longer lookup or choose table.

Second, we know that in order to use the twelve-month table we must have each formula return a value between 1 and 12.

Third, we know that the month values could go far beyond 12.

Fourth, we know that subtracting 12 from the month values over 12 works only for the year that follows and not for the years after that.

Thus, it seems that any value less than or equal to 12 is okay and that any value greater than 12 must be reduced to 12 or less.

@IF would certainly seem to be a logical solution. It gives us the opportunity to make selections based on values. But does it work? Yes, you

can probably make it work, but for each of the twelve months, you'll need another @IF function. A simple example for three years would be:

@IF(D10<13,D10,@IF(D10<24,D10 – 12,D10 – 24)

For a fourth year you'd need another @IF function. The whole business could get cumbersome.

So we're back to having to reduce a value to 12, but without using the @IF function. If you're an enterprising individual, you might want to consider some other logic functions. But there's a simpler solution. Dividing the month value by 12 tells us how many years we have. If we take the integer value of that result and multiply it by 12, we'll know how many months to subtract in order to leave the correct number of remaining months. Subtracting should give us our answer. So, for example, if we were talking about thirty-nine months, we'd divide 39 by 12 for an answer of 3.25. The integer value of this figure is 3; 3 multiplied by 12 is equal to 36. Subtract 36 from 39 and you get 3. March is the correct answer. (A solution!)

Well, not quite. Suppose we have thirty-six months. Dividing 36 by 12 gives us 3.0, the integer value of which is 3; 3 times 12 is 36, and 36 minus 36 is 0. The month value would be 0 for every December. We could go back to our table and change it to see if making December month 0 would work. But we may have a bit of a clue in what we just did.

The process we went through to arrive at the value 3 is something that *VisiCalc* provides a function for. The function is @MOD, called *modulo*. It is written:

@MOD(v1,v2).

Stated simply, @MOD returns the remainder after one value (v1) has been divided by another (v2). Using @MOD (36,12) returns 0, just as the solution we just arrived at did. Rather than changing the table to make 0 equal December, let's change the formula. (Finally, @IF may provide our answer.)

To state the problem in English: If the mod of our value is greater than 0, use the mod of that value; otherwise, use 12. That could be written:

@IF(@MOD(A15,12)>0,@MOD(A15,12),12)

Another way to write it would be:

@IF(@MOD(A15,12) = 0,12,@MOD(A15,12)

Both formulas return the same answer. If we use 39 as our value, March will be displayed; if we use 36, December will be displayed.

The @LABEL function can be quite useful, saving you time and providing a definitive analysis tool—a method of analysis that "tells" you an answer. You'll soon find that the more you use the @LABEL function, the more you'll want to use it.

Pick a Number—Any Number. Here's another opportunity—a problem any *VisiCalc* user can solve. You might encounter this kind of problem in many different types of templates, and it doesn't require *Advanced Version*.

Suppose we're running a tournament for a local golf club. In order to qualify for the tournament, the average of the entrant's last six rounds must be under 100 and all rounds must have been played within the last month. We want *VisiCalc* to calculate automatically the average of the last six rounds for each player. Sounds simple, so far.

Let's make it even easier and assume that all members of the club have played at least the minimum number of times during the month. We maintain records of all rounds played, with the latest date displayed at the left of the template. To keep our solution simple, we'll look at only two players' scores. Figure 5 shows Fred's and Marge's records.

Our task is to average each player's last six scores. For simplicity's sake, we'll use only the information shown in the figure—eleven days' scores—rather than a whole month's worth of scores. Our solution will apply to the whole month's scores too.

So what's our task? To average the first six scores across each row, starting in column B. We'll enter Fred's and Marge's averages in B8 and B9.

The obvious way to proceed is to average each player's row. But think about that for a minute. What we're trying to obtain is averages of their *last* six scores. Averaging the rows would give us a valid average of

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	DATE:	9/30	9/29	9/28	9/27	9/26	9/25	9/24	9/23	9/22	9/21	9/20
3												
4	FRED		96		93	103	95		89	90		95
5	MARGE	87	94		90		88	109				94
6												
7	AVERAGES											
8	FRED											
9	MARGE											

Figure 5.

their scores for the entire month but wouldn't separate out the last six scores to give us the averages we seek.

Another solution would be to enter @AVERAGE(C4...J4) starting with Fred. That would give us Fred's average score for the last six times he played. Replicating that into B9 won't give us Marge's average because her first score is in B5 and her sixth score is in L5. The correct formula for Marge's average is @AVERAGE(B5...L5). Suppose another player, Jim, played every day during the first six days of the month. The formula for averaging Jim's scores would be @AVERAGE(Z6...AE6). Notice that each average requires a different range.

Now imagine that there are thirty club members who might qualify for this tournament and that we are going to have another tournament at the end of every month. In order to determine which players qualify, we would have to go through each player's scores each month and select the appropriate range to include the last scores. That could be a time-consuming process. There must be a better way.

The @CHOOSE function might be the solution. According to the reference card, @CHOOSE "returns the vth element in a list." Asking for a sum of the first, second, third, fourth, fifth, and sixth scores in each row and then dividing by six should allow us to average just the first six rounds.

The function is written @CHOOSE(v,list). If we wanted the second value in a list, we'd enter @CHOOSE(2,A50...A75). Obtaining the third value would simply require substituting 3 for 2. Remember that a list can be a combination of values, cell references, and ranges separated by commas. The expression A12...A45,12,B4...L4,F35 is a valid list.

The formula for Fred's average would be:

```
(@CHOOSE(1,B4...L4) + @CHOOSE(2,B4...L4) +
@CHOOSE(3,B4...L4) + @CHOOSE(4,B4...L4) +
@CHOOSE(5,B4...L4) + @CHOOSE(6,B4...L4)/6)
```

Does it work? Well it does give us an average, but the average looks suspiciously low, approximately two-thirds what we'd have expected. Players would love to have averages like that! In actuality, our formula averaged only four of the scores. Why? The answer can be found in the wording of the description in the reference card. @CHOOSE(v,list) "returns the vth element in the list." It does not discriminate between cells containing actual values and cells that are blank. @CHOOSE considers a blank to be an element containing a value equal to zero. The first and third elements in Fred's list of scores are blanks, and the second, fourth, fifth, and sixth elements are values. Hence the average we obtained is the sum of four actual scores divided by six. @CHOOSE isn't the answer.

@LOOKUP is another possibility. According to the reference card, @LOOKUP "compares v to the successive values in range, finds the largest value less than or equal to v, and returns the corresponding value from an adjacent range." As we know from our @LABEL experience, @LOOKUP requires two columns or rows, one containing the values be-

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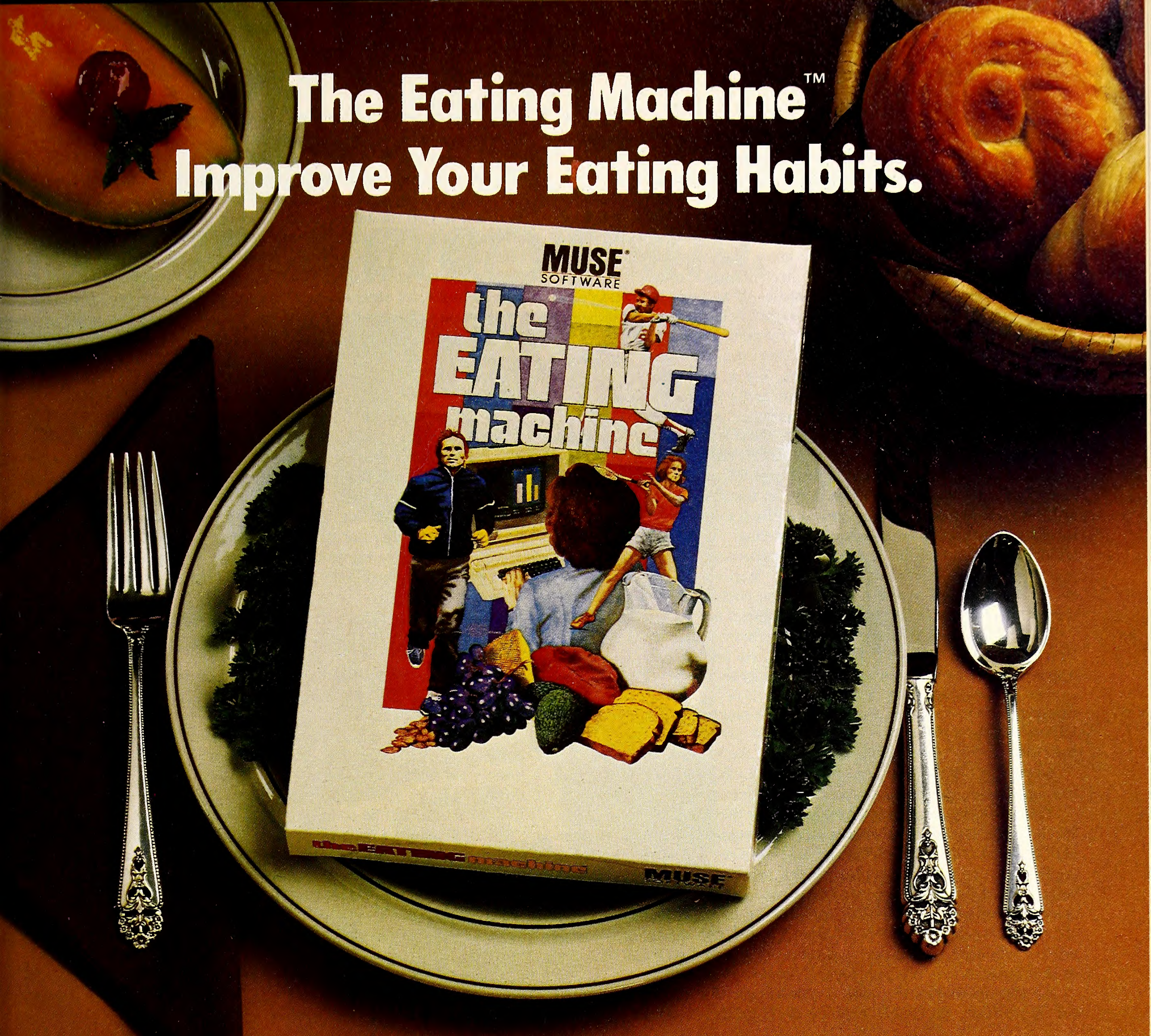

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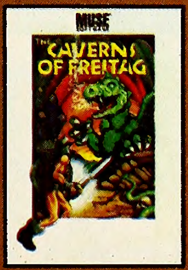

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ing compared against the lookup value and the other containing the values to be returned. @LOOKUP doesn't seem to buy us anything over @CHOOSE, and in addition it requires that we use another row.

@COUNT is the next function that looks promising. Again from the reference card, we know that @COUNT returns the "number of nonblank entries in a list." That sounds interesting. @CHOOSE assumes that empty cells are values, but @COUNT ignores blank entries.

If we @COUNT Fred's row we'll know how many times he played during the month. We don't really need that information, though. Rather, we need to locate the first six entries. If we knew how many cells were required to include our six rounds, we could use @COUNT. But we don't, and having to determine the range of the first six scores for each player presents the same problem that using @AVERAGE did.

But we may be on to something here. We do have a given range for each of Fred's scores in row 4. If we were to use 9/30 as the beginning of the range and each score as the end of the range, we could count back until we found six scores. For example, @COUNT(B4...B4) would return a 0 because there is no value in B4, @COUNT(B4...B5) would return a 1 because there's a single value in the range B4...B5, and so on.

Notice what we've done. The range in the first formula is a single cell. The range in the second is two cells. Both ranges start with cell B4. In other words, each successive cell contains a range that is one cell wider than the previous range. Sounds like we are back to a lot of work entering formulas. No way! Replicating the formula @COUNT(B4...B4) across a row using no change and relative for the references will ensure that each cell has a range that increments by one.

Insert three rows (/IR,/IR,/IR) below Fred's scores and let's try it. Enter @COUNT(B4...B4) in B5. Replicate it through L5 using no change and relative references. Your template should look like figure 6.

Notice that each time a new score enters the range, @COUNT displays the correct number of scores in the range up until that point. It tells us that our sixth score is in column J. So now we have our first solid information. We've determined how to find the first six scores.

Now what? Before reading on, see if you can determine how to use this information to solve the rest of our problem.

The first thing we need to know is whether the value displayed in row 5 is less than, equal to, or greater than the required six scores. A comparison using one of the logical operators will resolve that. What we're really interested in is whether the value is less than or equal to six. If the value is score number seven, we don't care. The comparison +B5<=6 entered in B6 will return TRUE; the value in B5 (0) is indeed less than six. Replicate the formula in B6 across row 6 and through L6, using relative reference. By the time you reach J6, you've found that the value in J5 is equal to six. We have located the end of our range.

K5 also shows that the value is equal to six. But there's no score in K4. Remember, @COUNT is going to return the same value until the range expands to include another score. We need to find some way to ignore any cells beyond the sixth score.

We could use @IF. Let's use row 7 to see if we can resolve our problem. If we can display only the first six scores, we have our solution.

The @IF function is written @IF(1,v1,v2). Our logical comparison in row 6 is 1. If the logical comparison is TRUE, v1 is returned; if the comparison is FALSE, v2 is returned. If we use the relative cell reference in row 4 as v1, it will return a score only if the logical comparison (1) is true and there is a value in the appropriate cell. If there is a 0, as in K4, v1 returns 0 and can't affect our average. If the logical comparison is false, v2 will be returned.

If, as in the case of cell K4, the logical comparison is TRUE, only a 0 will be returned. If there were a value in K4, the logical comparison would display FALSE because K4 would be the seventh score. The @IF function wouldn't return the value of that cell.

What should we use for v2? Since we don't want a value returned, the answer, obviously, is 0. The formula in B7 should be @IF(B6,B4,0). Replicate that across row 6 using relative reference and we're almost finished. Notice that the only values displayed are the first six scores.

The method we've just worked out is a very memory-intensive way of accomplishing our task. Each golfer requires four rows. There should be a way to simplify our template. Notice that the formulas in B5, B6, and B7 are directly related. If we started with the formula in B7 and substituted the appropriate formula for each cell reference, we could combine them.

The formula in B7 is @IF(B6,B4,0). Substituting B5 and B6 we get:

@IF(@COUNT(B4...B4)<=6,B4,0)

Enter this formula into B5 and replicate using no change, relative, relative. Delete the two remaining rows (6 and 7) and your template should look like figure 7.

Finally, enter Fred's average in B9. Of course we can't do that by entering @AVERAGE(B5...L5). Why not? Because the average function would average in the zeros also. So we must do something slightly different. Enter @SUM(B5...L5)/6 into B9 and our average of Fred's first six scores will be complete.

Now you have a method of picking a certain number of values out of a range of cells containing both values and blanks. This capability can be very useful. For example, it could be used in accounts payable templates or stock templates. This method isn't an end in itself; it is just a method of helping you solve a problem. If you understand how it works, you can even use parts of it to solve other problems. You can also modify it to do other things.

Going back to our original problem, here's one last conundrum to solve. Suppose some members of the club haven't played the minimum six rounds. How would you ignore their scores?

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	DATE:	9/30	9/29	9/28	9/27	9/26	9/25	9/24	9/23	9/22	9/21	9/20
3												
4	FRED		96		93	103	95		89	90		95
5		0	1	1	2	3	4	4	5	6	6	7
6												
7												
8	MARGE	87	94		90		88	109				94
9												
10	AVERAGES											
11	FRED											
12	MARGE											

Figure 6.

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	DATE:	9/30	9/29	9/28	9/27	9/26	9/25	9/24	9/23	9/22	9/21	9/20
3												
4	FRED		96		93	103	95		89	90		95
5		0	96	0	93	103	95	0	89	90	0	0
6	MARGE	87	94		90		88	109				94
7												
8	AVERAGES											
9	FRED											
10	MARGE											

Figure 7.

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Buy the software first.

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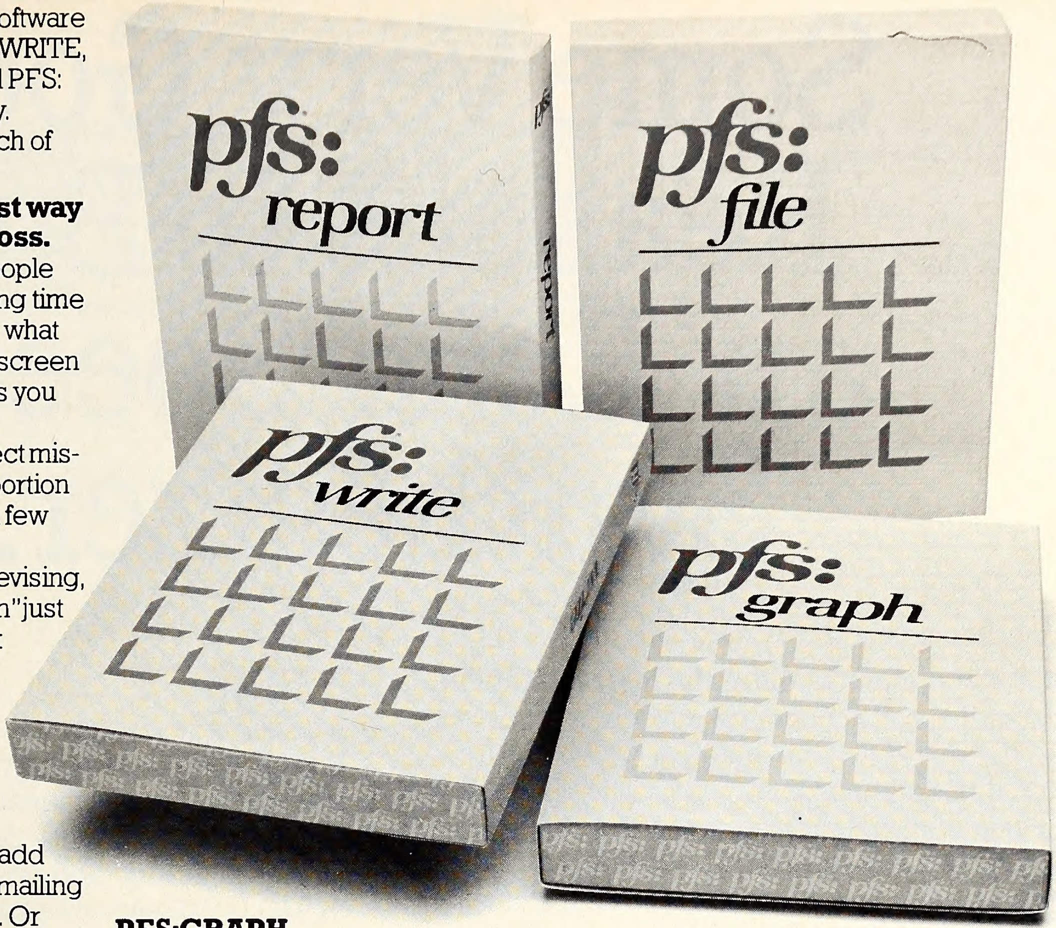

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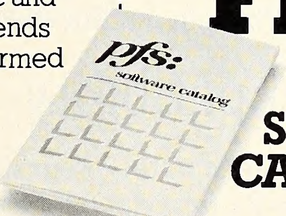

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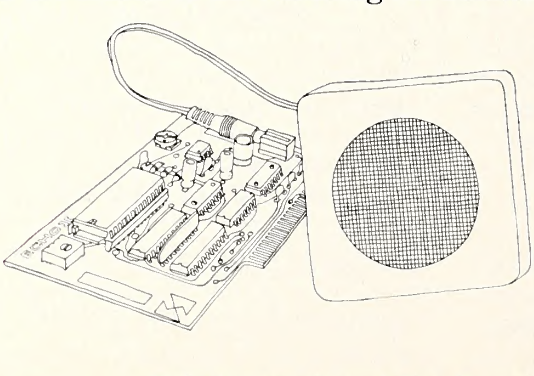

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THE BASIC Solution

By Wm. V. R. Smith

David Durkee subs for William V.R. Smith this month.

As you become more skilled in your use of Basic, you are bound to stumble sooner or later on the hexadecimal numbering system, or base sixteen. If you start dealing with memory locations directly, you'll find that when read in decimal, most of the important ones appear to have been randomly selected. For instance, the locations of the two hi-res screens are 8192 and 16384. Why those numbers? Well, in hexadecimal, or hex, the numbers are expressed as $2000 and $4000.

In binary, or base two, which is really the base the microprocessor works in, the numbers are %0010 0000 0000 0000 and %0100 0000 0000 0000. The dollar sign preceding the hex numbers and the percent sign in front of the binary numbers are standard ways of indicating those number bases. Sixteen-digit binary numbers are broken into four-digit groups for clarity. At its highest levels, the Apple translates all numbers into decimal for you. At the lower levels, like the Monitor and the disassembler, numbers are expressed in hexadecimal.

The hex system is used at the lower levels because it is a closer representation of the original binary number. You'll notice that each of the four-digit groups within the binary numbers corresponds to a single digit of the hex numbers. Each zero in hex becomes four zeros when translated to binary. The 2 and the 4 in the hex numbers become 0010 and 0100. Of course, a four-digit hex number is less unwieldly than a sixteen-digit binary number.

There is no easy correspondence between binary and decimal. Since everything in the computer, from the number of bytes in a 64K system (65,536) to the number of different values that one byte can hold (256), is based on powers of two, it makes a lot of sense to use a number system that relates to binary easily. Which is why the Monitor, assemblers, diskzap utilities, memory maps, and other advanced references all use hex. If they use decimal too, that's an extra. Even DOS accepts parameters in hex as well as in decimal.

Basic and assembly language make a great team. Basic provides ease of programming, and assembly language can provide the speed that Basic lacks, when it's absolutely necessary. If, as a Basic programmer, you ever want to use assembly language from one of your programs, or even if you just want to call a Monitor routine from one of your programs, you will at some time be called upon to translate numbers back and forth between hex and decimal.

The *Base Converter* program listed here can do the translating for you—not only between decimal and hex, but to and from binary as well. When you run the program, a three-column template appears on the screen with headers for the three number bases. A menu at the bottom prompts:

```
NUMBER BASE (1 - 3) OR 4 - CLEAR OR
5 - EXIT
```

The numbers one to three refer to the column headings. To translate a number from one base to both of the others, hit the number associated with that base. The cursor will move to the column of your choice and the message at the bottom will change to:

```
HIT ESCAPE TO GET MENU.
```

At that time, you can start typing numbers in the chosen base. When you hit return, the number you've typed will be translated to the other two bases. The input routines used won't allow you to type in illegal characters. For decimal, you can enter only digits 0 through 9. For hex, you can enter 0 through 9 and A through F. For binary, your choices are limited to 1 and 0. You don't need to type the identifying dollar and percent signs; the number's column indicates which base it is in.

There are also restrictions on the lengths of the numbers. Hex numbers can have four digits, binary numbers can have sixteen, and decimal numbers can have five. Since some five-digit decimal numbers (any number greater than 65,535) can't translate to four-digit hex or sixteen-digit binary, there's a provision for an error message in the output routine should such a number be entered.

Here's the program. Enjoy.

```
10   REM NUMBER BASE CONVERTER
20   REM  FOR DECIMAL, BINARY,
30   REM  AND HEXADECIMAL
40   TEXT : HOME :BS$ = CHR$ (8) + " "
     + CHR$ (8)
50   VTAB 1: HTAB 14: PRINT "NUMBER
     BASE"
60   INVERSE
70   PRINT " 1 - DEC    2 - HEX
     3 - BINARY                "
80   FOR Y = 3 TO 20
90   VTAB Y: HTAB 1: PRINT " ";: HTAB 9:
     PRINT " ";: HTAB 16: PRINT " ";: HTAB
     38: PRINT " ";
100  NEXT Y
110  HTAB 1
120  PRINT SPC( 37): PRINT
130  NORMAL
140  POKE 34,3: POKE 35,19
200  REM MENU INPUT
210  POKE 32,0: POKE 33,40
220  VTAB 21: HTAB 1
230  PRINT "MENU:";: VTAB 22: HTAB 1
240  PRINT "NUMBER BASE (1 - 3) OR
     4 - CLEAR OR 5 - EXIT";
250  GET NB$
260  IF ASC (NB$) < 49 OR ASC (NB$) >
     53 THEN 200
270  IF NB$ = "5" THEN VTAB 21: HTAB
     1: CALL - 868: VTAB 22: CALL
     - 868: GOTO 290
280  VTAB 21: HTAB 1: CALL - 868: VTAB
     22: HTAB 1 : PRINT "HIT ESCAPE TO
     GET MENU."; SPC( 16)
290  ON ASC (NB$) - 48 GOTO
     300,500,800,1340,10000
300  REM  DECIMAL INPUT
310  IF PV = 0 THEN PV = 4
320  POKE 32,2: POKE 33,6
330  VTAB PV: HTAB 6: PRINT
340  N$ = ""
350  GET A$: IF ASC (A$) > 47 AND ASC
     (A$) < 58 THEN PRINT A$;:N$ = N$
     + A$: GOTO 430
360  IF ASC (A$) = 13 THEN 460
370  IF ASC (A$) = 27 THEN HTAB 1:
     PRINT  SPC( 5);: GOTO 200
380  IF ASC (A$) <> 8 THEN 430
390  IF N$ = "" THEN 350
400  IF LEN (N$) = 1 THEN N$ = "":
     GOTO 420
410  N$ = LEFT$ (N$, LEN (N$) - 1)
420  PRINT BS$;
430  IF LEN (N$) = 5 THEN 450
440  GOTO 350
450  GET A$: GOTO 360
460  N = VAL (N$)
470  GOTO 1100
500  REM  HEX INPUT
510  IF PV = 0 THEN PV = 4
520  POKE 32,10: POKE 33,5
530  VTAB PV: HTAB 5: PRINT
540  N$ = "":N = 0
550  GET A$: IF ASC (A$) > 47 AND ASC
     (A$) < 58 OR ASC (A$) > 64 AND ASC
     (A$) < 71 THEN PRINT A$;:N$ = N$
     + A$: GOTO 630
560  IF ASC (A$) = 13 THEN 660
570  IF ASC (A$) = 27 THEN 200
580  IF ASC (A$) <> 8 THEN 630
590  IF N$ = "" THEN 550
600  IF LEN (N$) = 1 THEN N$ = "":
     GOTO 620
```

```
610  N$ = LEFT$ (N$, LEN (N$) - 1)
620  PRINT BS$;
630  IF LEN (N$) = 4 THEN 650
640  GOTO 550
650  GET A$: GOTO 560
660  IF N$ = "" THEN N = 0: GOTO 720
670  FOR CT = LEN (N$) TO 1 STEP - 1
680  T = ASC ( MID$ (N$,CT,1)):P = LEN
     (N$) - CT
690  T = T - 48: IF T > 9 THEN T = T
     - 7
700  N = N + T * 16 ^ P
710  NEXT CT
720  GOTO 1100
800  REM  BINARY INPUT
810  IF PV = 0 THEN PV = 4
820  POKE 32,17: POKE 33,19
830  VTAB PV: HTAB 19: PRINT
840  N$ = "":N = 0
850  GET A$: IF ASC (A$) = 48 OR ASC
     (A$) = 49 THEN PRINT A$;:N$ = N$
     + A$: GOTO 930
860  IF ASC (A$) = 13 THEN 960
870  IF ASC (A$) = 27 THEN 200
880  IF ASC (A$) <> 8 THEN 930
890  IF N$ = "" THEN 850
900  IF LEN (N$) = 1 THEN N$ = "":
     GOTO 920
910  N$ = LEFT$ (N$, LEN (N$) - 1)
920  PRINT BS$;
930  IF LEN (N$) = 16 THEN 950
940  GOTO 850
950  GET A$: GOTO 860
960  IF N$ = "" THEN N = 0: GOTO 1020
970  FOR CT = LEN (N$) TO 1 STEP - 1
980  T = ASC ( MID$ (N$,CT,1)):P = LEN
     (N$) - CT
990  T = T - 48
1000  N = N + T * 2 ^ P
1010  NEXT CT
1020  GOTO 1100
1100  REM  OUTPUT
1110  POKE 32,2: POKE 33,6
1120  VTAB PV: HTAB 6: PRINT
1130  N$ = STR$ (N): PRINT RIGHT$
      ("      " + N$,5)
1140  POKE 32,10: POKE 33,5
1150  IF N > 65535 THEN N$ = "XXXX" +
      CHR$ (7): GOTO 1220
1160  M = N:N$ = ""
1170  FOR CT = 3 TO 0 STEP - 1
1180  T = INT (M / 16 ^ CT):M = M - T *
      16 ^ CT
1190  T = T + 48: IF T > 57 THEN T = T
      + 7
1200  N$ = N$ + CHR$ (T)
1210  NEXT CT
1220  VTAB PV: HTAB 5: PRINT
1230  PRINT N$
1240  M = N: POKE 32,17: POKE 33,19:
      VTAB PV: HTAB 19: PRINT
1250  IF N > 65535 THEN PRINT
      "NUMBER TOO LARGE": GOTO
      1320
1260  FOR V = 12 TO 0 STEP - 4
1270  FOR V1 = 3 TO 0 STEP - 1
1280  CT = V + V1
1290  T = INT (M / 2 ^ CT):M = M - T * 2
      ^ CT
1300  PRINT T;
1310  NEXT V1: PRINT " ";: NEXT V
1320  PV = PV + 1: IF PV = 19 THEN PV
      = 18
1330  GOTO 290
1340  PV = 4: POKE 32,2: POKE 33,6:
      HOME
1350  POKE 32,10: POKE 33,5: HOME
1360  POKE 32,17: POKE 33,19: HOME
1370  GOTO 200
10000  TEXT : END
```

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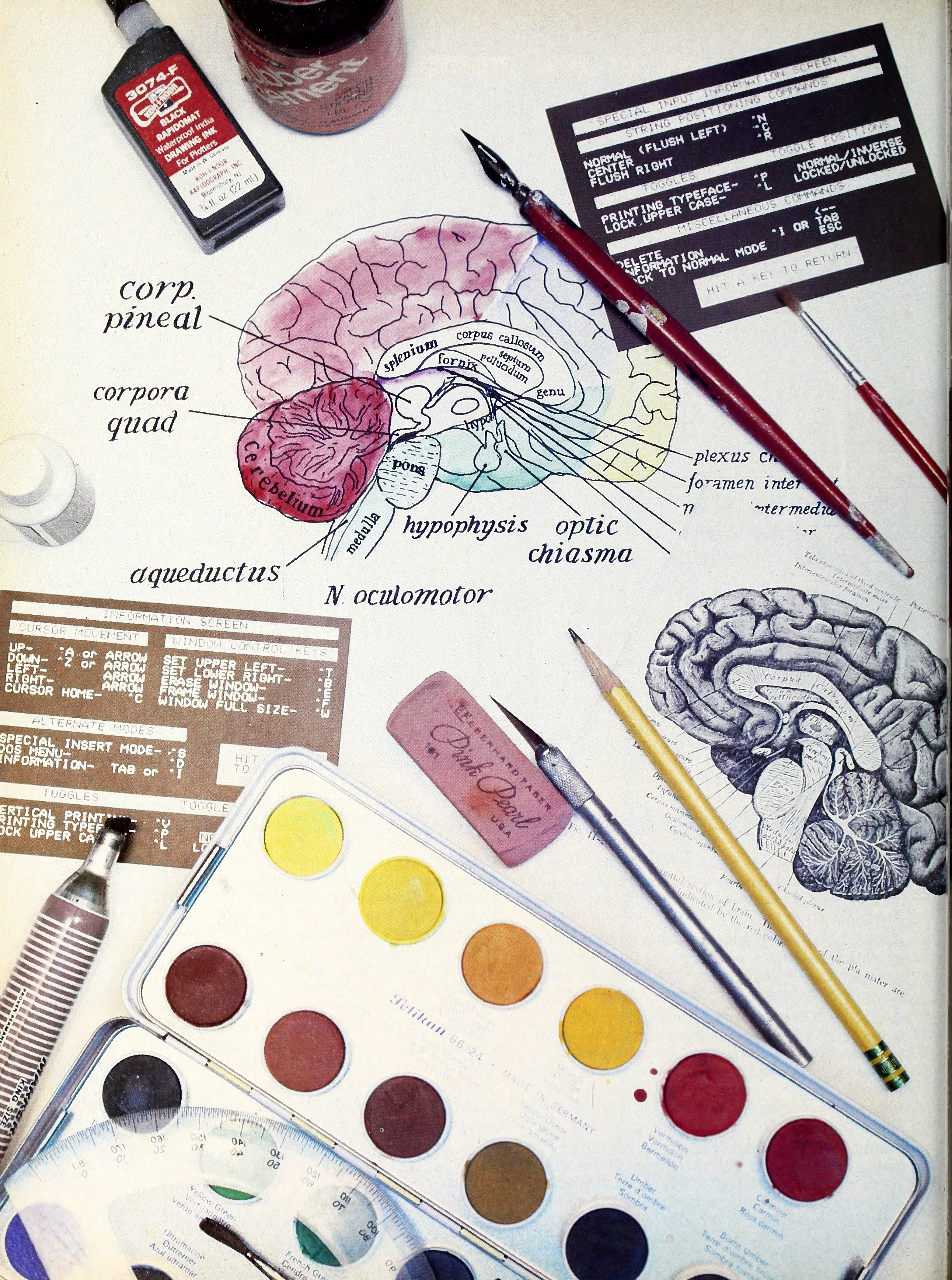

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optic chiasma
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septum pellucidum
genu
pons
medulla
Cerebelium
plexus ch
foramen inter
SPECIAL INPUT INFORMATION SCREEN
STRING POSITIONING COMMANDS
NORMAL (FLUSH LEFT) ^N
CENTER ^C
FLUSH RIGHT ^R
TOGGLES
TOGGLE POSITIONS
PRINTING TYPEFACE- ^P NORMAL/INVERSE
LOCK UPPER CASE- ^L LOCKED/UNLOCKED
MISCELLANEOUS COMMANDS
^I OR TAB
HIT A KEY TO RETURN
INFORMATION SCREEN
CURSOR MOVEMENT
UP- ^A or ARROW
DOWN- ^Z or ARROW
LEFT- ARROW
RIGHT- ARROW
CURSOR HOME- ^C
WINDOW CONTROL KEYS
SET UPPER LEFT- ^T
SET LOWER RIGHT- ^B
ERASE WINDOW- ^E
FRAME WINDOW- ^F
WINDOW FULL SIZE- ^W
ALTERNATE MODES
SPECIAL INSERT MODE- ^S
INFORMATION- TAB or ^I
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IInd Grade Chats

Help! It's Another Kit! This One Makes Help Screens

by David Durkee

In the beginning, there were only programmers and hobbyists, and the difference between the two was mostly a matter of degree. Beyond those haves, there were only the have-nots. Today there's a vast and constantly growing middle class of microcomputerdom, the users. As a programmer, you have a responsibility to those users.

When you write a program entirely for your own use, it doesn't really matter how easy it is to run. Even if you planned nothing beforehand, you have a way of learning a program as you write and debug it. The user doesn't have the benefit of all that trial-and-error experience at the program's inception. For that reason, it's a good idea to incorporate some sort of help into your programs. A manual is fine, but something that will pop up on the screen when the user feels stuck or confused is sometimes better.

There are lots of ways to go about helping the user from within a program. Two programs published by Apple, *Apple Writer II* and *Quick File II*, take contrasting approaches to the same issue. Each provides help in a way that is appropriate to the nature of the program.

Dueling Menus. *Apple Writer II* has one essential mode. Within that mode it offers a plethora of commands. For that reason (probably), the program has one central help menu. From that menu the user can call up a help screen on almost any subject pertaining to editing and printing with *Apple Writer*.

Quick File II, on the other hand, has a number of different menus and modes and several different sets of command keys. For that reason, this program has more than one help screen. Rather than giving you a help menu encompassing the whole program, *Quick File* helps you with whatever mode you are in at the time.

Both programs load the help information from disk when the user asks for it. Both also deal with large amounts of data in memory. The more memory available for data, the more valuable this kind of program is to its users. If you're writing a program that doesn't require so much data storage—most don't come near to using the whole 48 or 64K—and you want to include a help screen or two, it may be best to have the help screens coresident in memory with the program. People are more inclined to use a help screen that pops up when they need it and disappears quietly into the ether when its work is done than one that makes them wait. The program contained in this article is intended to demonstrate that observation by the way it handles its own help screens while making it easier to create appealing help screens for your own programs.

It's difficult to create a help screen from within an Applesoft program, because an Applesoft program isn't all that easy to edit. There's a lot of trial and error: sometimes more error than you would like. Print statements have an annoying way of not lining things up the way you want them to. The problem is less severe if you have a good program editor like *PLE*, but it's still a problem.

So how else can you create a help screen for an Applesoft program? Try editing the screen itself. Last month's IInd Grade Chats explained a technique for reserving as much contiguous memory, starting with text page two, as you might need for help screens. It also demonstrated a way of moving screens full of information from what the author called the "phantom text pages" to either of the two displayable pages. With *Help! Edit*, this month's program, you'll be able to edit and save text screens to put in those holes.

An Overview of the Program. The program's main function is to allow you to edit and save a help screen. Basically, the printable characters you type appear on-screen at the position of the cursor. Of course there are a few control-character commands to embellish the program. For starters, there's control-P, which toggles between inverse and normal printing. (The program makes no provision for flashing because flashing messages are annoying to the eyes and make the cursor harder to find.) Control-V toggles between horizontal printing and vertical printing. (Don't ask why anyone would want vertical printing. Someone will come up with a reason.) Control-L acts as a caps lock for the Apple II Plus. In lower-case mode, the program uses the standard one-wire shift-key mod to shift between upper and lower case.

You have complete control over the cursor's position on the screen, except that you can't use the bottom line, for reasons that will be explained later. Cursor movement is accomplished by means of the four ar-

rows on the Apple IIe or by using the two arrows and control-A and control-Z for up and down movement on the II Plus. In addition, control-C places the cursor in the upper left corner of the currently active window (that is, the area of the text screen you're currently working on). Because the cursor direction keys wrap to the opposite side when you run over an edge, control-C leaves you only one or two keys away from any of the corners.

Normally this window is open to the full forty-column width of the screen and the top twenty-three lines. You can limit this window to a smaller area by moving the cursor and pressing control-T or control-B. Control-T sets new values for the top and left edges based on the cursor position. Control-B does the same thing for the bottom and right edges. Hitting control-W returns you to a full-size window.

The window isn't just a way to restrict cursor movement. A window permits you to perform block operations. You can erase the window without touching text that lies outside of it by pressing control-E. By pressing control-F, you can make a frame out of inverse spaces around the edges of the window. This command has the additional effect of shrinking the window by one character space at all four edges so that the characters you type afterward don't overlap the frame.

The window concept is also essential for a special input mode, invoked with control-S. Special input allows you to enter text that is either centered within the window or flush against the right or left edge. This mode is useful for making formatted lists. Flush left is considered normal, so a control-N makes the text on the current line flush left. Flush right and centered text are control-R and control-C respectively. The left arrow deletes characters from the end of the string. The control-L and control-P toggles still operate in special input mode, but none of the other commands work here. Escape brings you back to regular mode.

Finally, there's a DOS menu for saving text screens, loading previously saved screens, and cataloguing the disk. Load and save allow you to enter file names; catalog allows you to change the drive number. If you want to load from or save to a different drive than the one you ran the program from, all you have to do is catalog the new drive first. As with the special input mode, escape puts you back in the regular mode. The DOS menu also provides the way out of the program, a quit option.

If you have any trouble remembering all this when you run the program, refer to the two built-in help screens. One is for regular mode and the other is for special input mode. Both are invoked with control-I. The I stands for information, but using that character also means that the tab key on the IIe becomes a help key.

Internal Affairs. The first thing to do is reserve the necessary memory, as shown last month. We need only one extra text page to work with, so the program's start address will be right after text page two. The address is 3072, or $C00. This hello program sets up the program start address and runs the main program:

```
10  POKE 104,12: POKE 103,1: POKE 3072,0
20  PRINT CHR$( 4);"RUN HELP.EDIT"
```

This hello program has to be separate from the main program because the pokes just change the pointers and don't move the program itself. When the main program, which must have the file name Help.Edit, is loaded, it will begin at the new address.

To begin, initialize a new disk with this two-liner as the hello program or save it on an existing disk as Help.Hello, or something similar. The important thing to remember is that, when you're getting started, you must run this program first, not the main program. If you run the main program with the starting address still at $800, the program will go down in flames—crash and burn—the first time you invoke a help screen or the DOS menu. This point can't be stressed enough.

Disclaimer. By the way, if you're having trouble following any of this, look for much of the necessary background information in last month's IInd Grade Chats.

Once you've saved the hello program, run it. You'll get a file-not-found error, but the pointers will still be set up correctly. Type *new* and you're ready to begin entering *Help! Edit*. Here's the initialization section.

```
10      GOTO 10000: REM INITIALIZATION
10000  REM POKE IN MOVE VECTOR
10010  L = 768
10020  FOR L1 = L TO L + 5
10030  READ B: POKE L1,B
10040  NEXT L1
10050  DATA 216,160,0,76,44,254
10060  REM WINDOW CORNERS AND CURSOR POSITION
10070  TE = 1:BE = 23:LE = 1:RE = 40
10080  CH = LE:CV = TE
10090  IIE = ( PEEK ( - 1267) = 229): REM SET APPLE VERSION
10100  PD = 1: REM PRINT HORIZONTAL
10110  SJ = 1
10120  HOME : TEXT : INVERSE : PRINT " HIT CONTROL-I OR TAB
       FOR INFORMATION ";: POKE 2039,32: NORMAL
10130  D$ = CHR$ (4)
10140  GOTO 200
```

Lines 10010 through 10050 set up a small machine lanuage routine at $300 (768). This routine sets up for and calls the Monitor memory move routine, as described last month. Most of the rest of initialization consists of assigning crucial variables. Line 10070 defines the full-size text window. The four variables stand for top, bottom, left, and right edges.

The Bottom Line Is You Can't Use It. The reason the bottom edge is set to 23 instead of 24 is that the Apple's screen output routine has a nasty habit of scrolling the screen up one line if anything is printed in the last position of line 24. To avoid having this happen, we're using the bottom line exclusively as a reminder that a help screen is available and to tell users how to get it. Line 10120 prints that message. When you are typing the message in, make sure it contains exactly thirty-nine characters. The poke 2039,32 puts an inverse space in the last character position without going through the normal output routine, so the screen doesn't scroll up and the line looks complete.

This next section is the main keyboard interpreter. A keyboard interpreter is necessary because the program is designed to work as well on an Apple II Plus with a lower-case chip and a shift-key mod installed as it does on a IIe, and this requires a section to handle lower case. If you have an Apple IIe, or if you have an Apple II or II Plus without lower case, omit lines 40 through 130 if you want. (If you have a lower-case chip but no shift-key modification, you really should get the modification. It costs less than five dollars and is easy to install. If you insist on using escape or some control key to signify upper case, you'll have to modify this routine to handle it. Now wouldn't it be easier to buy the shift-key mod?)

```
20   REM MAIN KEYBOARD INTERPRETER
30   GET A$:A = ASC (A$)
40   SM = 0: IF PEEK ( - 16285) >127 THEN SM = 1: REM SHIFT
     MOD
50   IF A< 32 THEN 140
60   IF IIE THEN 140: REM SKIP UPPER/LOWER CASE HANDLING
70   IF SL THEN 140: REM SHIFT LOCK
80   IF SM THEN 130
90   IF A = 94 THEN A$ ="N":A = 78: GOTO 140
100  IF A = 93 THEN A$ ="M":A = 77: GOTO 140
110  IF A = 64 THEN A$ = "P":A = 80: GOTO 140
120  GOTO 140
130  IF A >64 AND A < 91 THEN A = A + 32:A$ = CHR$(A)
140  RETURN
```

The next section is called main input, although it has no input statement in it. The main input section actually uses the previous section to get one character. If the character is a control character (ASCII value less than 32), it is passed on to the control character handler. Otherwise the character is printed on-screen and cursor positioning is handled afterward. The variable PD (line 250) means print direction. If it equals zero, the cursor moves down instead of to the right after printing a character.

```
200  REM MAIN INPUT
210  NORMAL : IF NI THEN INVERSE
220  HTAB CH: VTAB CV: GOSUB 20
230  IF A< 31 THEN 300
240  PRINT A$;
250  IF PD THEN CH = CH + 1: GOTO 270
260  CV = CV + 1
270  IF CH >RE THEN CH = LE:CV = CV+ 1: IF CV >BE THEN
     CV = TE
```

```
280  IF CV > BE THEN CV = TE:CH = CH + 1: IF CH > RE THEN
     CH = LE
290  GOTO 200
```

The control command handler has a couple of different ways of dealing with control characters. Some characters send the machine to a separate routine. Others just change the values of a variable or two. Take a look at line 350. This line and the two following are toggle switches. The statement *PD = not PD* means that if PD equals zero, it becomes equal to one. If it's one, it becomes zero. Although the variable is a full floating point number like any other, we are using it as a simple two-state switch: on and off.

Each line in this section contains a remark noting which characters are acted upon and what they do. These remarks are there to help you change or debug the program.

```
300  REM CONTROL CHARACTER HANDLER
310  IF A = 9 THEN 1300: REM CONTROL-I; INFORMATION
320  IF A = 13 OR A = 1 OR A =26 OR A = 8 OR A = 21 OR A =
     10 OR A = 11 THEN 1700: REM RETURN, CONTROL-A,Z, AND
     FOUR ARROWS; CURSOR MOVES
330  IF A = 5 THEN 1800: REM CONTROL-E; ERASE WINDOW
340  IF A = 6 THEN 1900: REM CONTROL-F; FRAME WINDOW
350  IF A = 22 THEN PD = NOT PD: GOTO 200: REM CONTROL-V;
     TOGGLE PRINT DIRECTION
360  IF A = 16 THEN NI = NOT NI: GOTO 200: REM CONTROL-P,
     TOGGLE NORMAL/INVERSE
370  IF A = 12 THEN SL = NOT SL: GOTO 200: REM CONTROL-L;
     TOGGLE SHIFT LOCK
380  IF A = 20 THEN LE = CH:TE = CV: GOTO 200: REM
     CONTROL-T; SET TOP-LEFT OF WINDOW
390  IF A = 2 THEN BE = CV:RE = CH: GOTO 200: REM
     CONTROL-B; SET BOTTOM-RIGHT OF WINDOW
400  IF A = 23 THEN TE = 1:BE = 23:LE = 1:RE = 40: GOTO 200:
     REM CONTROL-W; SET FULL-SIZE WINDOW
410  IF A = 3 THEN CV = TE:CH = LE: GOTO 200: REM
     CONTROL-C; PLACE CURSOR AT HOME POSITION
420  IF A = 19 THEN 2100: REM CONTROL-S; ENTER SPECIAL
     INPUT MODE
430  IF A = 4 THEN 2700: REM CONTROL-D; GOTO DOS MENU
440  GOTO 200
```

The next few lines do a very simple thing: They poke an address into two bytes of memory. It's a useful way for a Basic program to send an address to a machine language program.

```
1000  REM TWO-BYTE POKE
1010  REM LOC = LOCATION OF FIRST BYTE
1020  REM NUM = NUMBER TO POKE IN
1030  POKE LOC + 1,NUM / 256
1040  POKE LOC,NUM - PEEK (LOC + 1) * 256
1050  RETURN
```

Move It! Coming up is a routine that does block memory moves. The memory move is an intricate part of the multiple text page technique, the idea for which was presented last month. This routine acts only on text pages one and two; we aren't using the phantom pages. Depending on the value of MD, it either moves from page one to page two or vice versa. If you adapt this routine to your own programs, don't forget to poke in the six bytes of machine language at the beginning of the initialization section.

The three parameters needed for start, end, and destination—to be poked into the two-byte locations 60, 62, and 66—are discussed in the *Apple II Reference Manual* section on the Monitor move command. Also in that manual are some tricks to using the move routine that you might find interesting. Caution is advised: Faulty parameters in these locations can blow away DOS, your program, and anything else in RAM.

```
1100  REM TEXT PAGE MOVE
1110  REM MD = MOVEMENT DIRECTION
1120  REM   0 = PAGE 2 TO PAGE 1
1130  REM   1 = PAGE 1 TO PAGE 2
1140  IF MD THEN 1190
1150  NUM = 2048:LOC = 60: GOSUB 1000: REM START
      LOCATION
1160  NUM = 3071:LOC = 62: GOSUB 1000: REM END LOCATION
1170  NUM = 1024:LOC = 66: GOSUB 1000: REM DESTINATION
1180  GOTO 1220
1190  NUM = 1024:LOC = 60: GOSUB 1000: REM START
      LOCATION
1200  NUM = 2047:LOC = 62: GOSUB 1000: REM END LOCATION
1210  NUM = 2048:LOC = 66: GOSUB 1000: REM DESTINATION
1220  CALL 768: REM VECTOR TO MOVE ROUTINE
1230  RETURN
```

The next section, a long one, shows what we meant about creating help screens out of print statements. You may have to go through a fair amount of agony to get everything lined up correctly. Paying careful attention to the remarks on string lengths will make matters go more smoothly.

You'll notice that the first thing this routine does is call the memory move routine. This places the text page you're working on into page two for safekeeping. It might have been worthwhile to put this help screen on page two and just hit the screen switch to display it. However, a section of this screen will change based on certain variable values, so it behooves us to use text page one, on which we can print directly. The same is true for the other help screen and the DOS menu, both of which appear later in the program.

At the end of the help section, the move routine is called again to move the text back to page one.

```
1300  REM INFORMATION SCREEN
1310  MD = 1 : GOSUB 1100
1320  NORMAL : HOME : INVERSE : PRINT " INFORMATION
      SCREEN          ";
1330  VTAB 3: HTAB 1: PRINT " CURSOR MOVEMENT ": NORMAL
      : PRINT
1340  PRINT "UP -      ^ A or ARROW"
1350  PRINT "DOWN -  ^ Z or ARROW"
1360  PRINT "LEFT -          ARROW"
1370  PRINT "RIGHT -         ARROW"
1380  PRINT "CURSOR HOME -    ^ C"
1390  POKE 32,19: POKE 33,21: VTAB 3: HTAB 1
```

```
1400 INVERSE : PRINT " WINDOW CONTROL KEYS ";: NORMAL :
     PRINT
1410 PRINT "SET UPPER LEFT-      ^ T";: REM EACH OF THE
     STRINGS IN THIS AND THE NEXT FOUR LINES SHOULD BE
     21 CHARACTERS LONG
1420 PRINT "SET LOWER RIGHT-     ^ B";
1430 PRINT "ERASE WINDOW-        ^ E";
1440 PRINT "FRAME WINDOW-        ^ F";
1450 PRINT "WINDOW FULL SIZE- ^ W";
1460 TEXT: VTAB 12: INVERSE : PRINT " ALTERNATE MODES":
     NORMAL : PRINT
1470 PRINT "SPECIAL INSERT MODE-   ^ S"
1480 PRINT "DOS MENU-              ^ D"
1490 PRINT "INFORMATION-      TAB or ^ I"
1500 PRINT : PRINT : INVERSE : PRINT "        TOGGLES
     TOGGLE POSITIONS ": NORMAL
1510 PRINT "VERTICAL PRINTING-  ^V         ON/OFF";: REM
     THESE THREE STRINGS ARE EXACTLY FORTY
     CHARACTERS LONG
1520 PRINT "PRINTING TYPEFACE-  ^P    NORMAL/INVERSE";
1530 PRINT "LOCK UPPER CASE- ^ L  LOCKED/UNLOCKED";
1540 INVERSE : VTAB 21: IF PD THEN HTAB 38: PRINT "OFF";:
     GOTO 1560
1550 HTAB 35: PRINT "ON";
1560 VTAB 22: IF NI THEN HTAB 34: PRINT "INVERSE";: GOTO
     1580
1570 HTAB 27: PRINT "NORMAL";
1580 VTAB 23: IF SL THEN HTAB 26: PRINT "LOCKED";: GOTO
     1600
1590 HTAB 33: PRINT "UNLOCKED";
1600 VTAB 13: HTAB 29: PRINT SPC( 11);
1610 VTAB 14: HTAB 29: PRINT " HIT A KEY ";
1620 VTAB 15: HTAB 29: PRINT " TO RETURN ";
1630 VTAB 16: HTAB 29: PRINT SPC( 11);
1640 WAIT - 16384,128: GET A$
1650 MD = 0: GOSUB 1100: NORMAL : GOTO 200
```

The next section handles the cursor movement commands. It's hard to say whether it's more efficient to put these commands here or in the section from lines 300 to 440 that detects the command and jumps to this section. This way seems a bit redundant, but it keeps the earlier section simpler. So the cursor movement lines ended up here.

```
1700 REM CURSOR MOVEMENT
1710 IF A = 11 OR A = 1 THEN CV = CV - 1: IF CV < TE THEN
     CV = BE
1720 IF A = 10 OR A = 26 THEN CV = CV + 1: IF CV > BE THEN
     CV = TE
1730 IF A = 13 THEN CH = LE:CV = CV + 1: IF CV > BE THEN CV
     = TE
1740 IF A = 8 THEN CH = CH - 1: IF LE > CH THEN CH = RE
1750 IF A = 21 THEN CH = CH + 1: IF CH > RE THEN CH = LE
1760 GOTO 200
```

The next five lines erase the current window. This capability is useful when you want to clear part of the screen: Just set the window to the part you want cleared and press control-E. If the current print mode is inverse, the window will be cleared to white.

```
1800 REM ERASE WINDOW
1810 FOR X = TE TO BE
1820 VTAB X: HTAB LE: PRINT SPC( 1 + RE - LE);
1830 NEXT X
1840 GOTO 200
```

The Frame-up. The next section frames the current window by putting inverse spaces around the edge. It then shrinks the window. The new window setting, therefore, will be just inside the frame created, so you can write inside the frame without disturbing it.

```
1900 REM FRAME WINDOW
1910 INVERSE
1920 VTAB TE: HTAB LE: PRINT SPC( 1 + RE - LE);
1930 FOR X = TE TO BE
1940 VTAB X
1950 HTAB LE: PRINT " ";: HTAB RE: PRINT " ";: REM ONE
     SPACE EACH
1960 NEXT X
1970 VTAB BE: HTAB LE: PRINT SPC( 1 + RE - LE);
1980 TE = TE + 1:BE = BE - 1:LE = LE + 1:RE = RE - 1
1990 IF TE > BE OR LE > RE THEN PRINT CHR$ (7);:TE = 1:BE
     = 23:LE = 1:RE = 40
2000 CV = TE:CH = LE
2010 GOTO 200
```

The special input mode is like a separate program inside the main one. It has its own output routine, control command handler, and help screen. Special input really is a whole different mode. The normal input method places characters where the cursor was at the time and leaves them there. This mode handles more lines. The maximum length of the line it can handle is based on the current window settings. As you enter a string to go on the current line within the current window, special input mode automatically displays the line in the specified format: flush left, flush right, or centered.

```
2100 REM SPECIAL INSERT MODE
2110 LN = 1 + RE - LE
2120 L$ = ""
2130 SP = LN - LEN (L$)
2140 VTAB CV: HTAB LE
2150 NORMAL : IF NI THEN INVERSE
2160 IF SJ = 1 THEN PRINT SPC( INT (SP / 2));L$; SPC( INT ((SP + 1)
     / 2));: VTAB CV: HTAB LE + INT (SP / 2) + LEN (L$): GOTO 2200
2170 IF SJ = 0 THEN PRINT L$; SPC( SP);: VTAB CV: HTAB LE
     + LEN (L$): GOTO 2200
2180 IF SJ = 2 THEN PRINT SPC( SP);L$;
2190 REM STRING DISPLAYED; NOW GET INPUT
2200 GOSUB 20
2210 IF A < 32 THEN 2240
2220 IF LEN (L$) = LN THEN 2200
2230 L$ = L$ + A$: GOTO 2130
2240 IF A = 14 THEN SJ = 0: GOTO 2130
2250 IF A = 18 THEN SJ = 2: GOTO 2130
2260 IF A = 3 THEN SJ = 1: GOTO 2130
2270 IF A = 16 THEN NI = NOT NI: GOTO 2130: REM TOGGLE
     NORMAL/INVERSE
2280 IF A = 12 THEN SL = NOT SL: GOTO 2130: REM TOGGLE
     SHIFT LOCK
2290 IF A < > 8 THEN 2320
2300 IF LEN (L$) < = 1 THEN L$ = "": GOTO 2130
2310 L$ = LEFT$ (L$, LEN (L$) - 1): GOTO 2130
2320 IF A = 9 THEN GOSUB 2400
2330 IF A = 27 THEN 200
2340 IF A < > 13 THEN 2130
2350 CV = CV + 1: IF CV > BE THEN CV = TE
2360 GOTO 2100
```

Here's the routine for the special input mode help screen. You'll notice that it works in much the same way as the main help screen.

```
2400 REM SPECIAL INPUT INFORMATION SCREEN
2410 MD = 1: GOSUB 1100
2420 NORMAL : HOME : INVERSE : PRINT "     SPECIAL INPUT
     INFORMATION SCREEN      ";
2430 VTAB 3: PRINT "      STRING POSITIONING
     COMMANDS      ": NORMAL
2440 PRINT "NORMAL (FLUSH LEFT)   ^ N"
2450 PRINT "CENTER                ^ C"
2460 PRINT "FLUSH RIGHT           ^ R"
2470 PRINT : INVERSE : PRINT "      TOGGLES      TOGGLE
     POSITIONS ": NORMAL
2480 PRINT "PRINTING TYPEFACE- ^ P  NORMAL/INVERSE";
2490 PRINT "LOCK UPPER CASE-  ^ L  LOCKED/UNLOCKED";
2500 INVERSE
2510 VTAB 11: IF NI THEN HTAB 34: PRINT "INVERSE";: GOTO
     2530
2520 HTAB 27: PRINT "NORMAL";
2530 VTAB 12: IF SL THEN HTAB 26: PRINT "LOCKED";: GOTO
     2550
2540 HTAB 33: PRINT "UNLOCKED";
2550 VTAB 14: HTAB 1: PRINT "           MISCELLANEOUS
     COMMANDS           ";: NORMAL : PRINT
2560 PRINT "DELETE                  <--"
2570 PRINT "INFORMATION      ^ I OR TAB"
2580 PRINT "BACK TO NORMAL MODE        ESC"
2590 PRINT : INVERSE
2600 HTAB 10: PRINT SPC( 21): PRINT
2610 HTAB 10: PRINT " HIT A KEY TO RETURN "
2620 HTAB 10: PRINT SPC( 21)
```

```
2630  WAIT - 16384,128: GET A$
2640  MD = 0: GOSUB 1100: NORMAL : RETURN
```

At Long Last, DOS. This section starts out like the two help screens, by saving the text screen on page two and usurping page one for its own use. In another sense it's also like the special input mode: It has its own command interpreter and its own set of commands. In this case, the commands aren't control characters, but they're interpreted in essentially the same way. This section doesn't have its own help screen, but it does have a commands list at the top of the screen. The commands shown here allow you to catalog a disk, save the text screen you're working on, load a text screen that was previously saved, and quit. Returning to the main section of the program is accomplished by hitting escape.

Look closely at the way errors are handled in this section. This is about the minimum amount of error handling you need in order to prevent the user from crashing your program by leaving a disk drive door open, mistyping a file name, or causing other DOS-related errors that can happen to anyone. DOS errors usually result from a user mistake and not from a fault in the program, so it's almost always a good idea to put trapping like this around DOS commands.

The secret is not to overdo it. If you put one onerr goto in the listing and have it cover the whole program, you're going to run into trouble. Onerr suppresses normal error handling, including the messages that help you find bugs in programs. The best idea is to turn error trapping on immediately before a DOS command and off immediately afterward. You'll notice that even catalog has an onerr before it and a poke 216,0 folowing. After all, you can always enter a nonexistent drive number.

The Surgeon General Warns. . . . Speaking of possible errors, here's one that isn't protected against. Don't attempt to bload a file that wasn't created by this program. The bload command used here forces the file to load at $800, the beginning of the second page. If the file is longer than a text page, it's crashing time. You have been warned, so now you'll know what to say when a friend asks you what happens if you try to edit a hi-res picture.

You should also note that this routine bsaves screens at the address $800: text page two, where your working screen was moved when this section was entered. Keep that in mind when you're loading the screen from another program. If that program's start address is $800 (in other words, if you didn't change the pointers as we did before running this) and you load the picture there, the first 1,024 bytes of your program will disappear. There are less painful ways for a program to die.

(Remember, though, if you don't crash the system at least once in the development of a program, you're not doing serious work. Beginners never get the chance to wreak this kind of havoc.)

Deciding where to load the file relates to some other considerations, but they can wait until the end of the article.

```
2700  REM DOS MENU
2710  MD = 1: GOSUB 1100
2720  NORMAL : HOME : INVERSE : PRINT SPC(16);"DOS
      MENU";SPC(16);:NORMAL
2730  PRINT "C-CATALOG   L-LOAD   S-SAVE   Q-QUIT"
2740  PRINT "*** HIT ESCAPE TO RETURN TO PROGRAM ***"
2750  INVERSE : PRINT SPC( 40): POKE 34,4: NORMAL
2760  GET A$:A = ASC (A$)
2770  IF A>96 AND A< 123 THEN PRINT "PLEASE SET CAPS
      LOCK KEY": GOTO 2760
2780  IF A = 67 THEN 2880
2790  IF A = 76 THEN 2940
2800  IF A = 83 THEN 3010
2810  IF A = 81 THEN 3090
2820  IF A = 27 THEN 3160
2830  GOTO 2760
2840  REM ERROR TRAPPING
2850  POKE 216,0
2860  PRINT "*** ERROR ***"
2870  GOTO 2760
2880  REM CATALOG
2890  INPUT "CATALOG,";A$
2900  ONERR GOTO 2840
2910  PRINT D$;"CATALOG";A$
2920  POKE 216,0
2930  GOTO 2760
2940  REM LOAD
2950  INPUT "BLOAD ";A$
2960  IF A$ = "" THEN 2760
2970  ONERR GOTO 2840
2980  PRINT D$;"BLOAD";A$;",A$800"
2990  POKE 216,0
3000  GOTO 2760
3010  REM SAVE
3020  INPUT "BSAVE ";A$
3030  IF A$ = "" THEN 2760
3040  FOR X = 3024 TO 3063: POKE X,160: NEXT
3050  ONERR GOTO 2840
3060  PRINT D$;"BSAVE";A$;",A$800,L$400"
3070  POKE 216,0
3080  GOTO 2760
3090  REM QUIT
3100  PRINT "ARE YOU SURE YOU WANT TO QUIT?";
3110  GET A$
3120  IF A$<>"Y" AND A$<>"N" THEN 3110
3130  PRINT
3140  IF A$ = "Y" THEN TEXT : HOME : END
3150  GOTO 2760
3160  MD = 0: GOSUB 1100
3170  TEXT : HTAB 1: INVERSE : PRINT " HIT CONTROL-I OR TAB
      FOR INFORMATION ";: POKE 2039,32: NORMAL : GOTO 200
```

How you use the screens created by this program will depend on the program you're trying to document. If you want to conserve memory, but you have several screens' worth of helpful information, you'll probably want to keep each screen on disk and bload it when it's asked for. If that's the case, and your program doesn't depend on a carefully formatted text screen itself, you might find it easiest to bload the help screen right on top of text page one and then scroll it away when the user is finished with it.

An approach that will look more professional is to load the help screen into text page two and then page flip to display that page. The flip command is *poke 49237,0.* The text command gets your original display back intact. A couple of things to remember: If you're going to use text page two, reset the start-of-program pointer as we did for this program. If you're going to load it into text page one, or anyplace other than page two where it was saved from, you're going to have to tell DOS the address with the A parameter when you bload. A$400 gets you text page one, for instance.

Recipe for Help Screen Extraordinaire. If you have lots of memory handy and plenty of help screens to display, there is a preferred way of doing it. Load all the help screens into memory at once. Start at location 3072 ($C00) for the first one and proceed from there, loading each screen at a location 1,024 ($400) bytes after the start of the previous one. When they're all loaded, reset the start of program pointer to 1,024 bytes after the beginning of the last help screen and load your main program.

Use text page one exclusively for the interactive part of your program. When the user asks for help, have your program use the memory move routine to put the appropriate screen in text page two and flip the page to display it. The parameters for the memory move will be fairly simple. The destination address will always be 2048. The starting address will be the address you loaded the particular screen into in the first place, and the ending address will be the starting address plus 1,023. When you've finished with the help page, just flip back with the text command. You don't have to move anything.

One more thing. Once you've got the help screens all set up, you can tidy up your catalog by bloading them all in sequence and bsaving them as one file. Keep the individual files handy in case there's an error in one and you have to go back into *Help! Edit* to fix it. Having all the help screens in one file also speeds up the process of loading them and heightens the gee-whiz effect when you're showing the program to your friends.

Whether this program really helps you impress people depends mostly on their innate capacity to be impressed. Whether it helps people who are trying to use your programs, on the other hand, depends more on you. You have to plan out what the screens are going to say and how the user will invoke them. Is your program going to have menu-driven help screens like *Apple Writer*, or a separate screen or set of screens for each mode, like *Quick File*? Design a method based around your program and how it works, of course. If you can't make something useful out of these techniques, all they are is fancy page flipping.

So good luck, and have fun.

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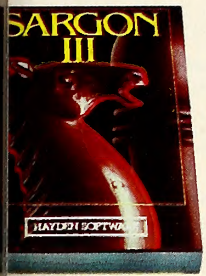

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The History of Everything—Sort Of. Way back in the old days, there were these things called typewriters. In some ways, they resembled computers; you would press a key, and the corresponding character would show up on a piece of paper that was secured in the device's "carriage."

The typewriter. Reporters reported with them, writers sat for hours by them, and musicians occasionally used them as a percussion device.

Though they looked really complicated on the inside, their operation was quite simple. You pressed a key and a series of joints and levers raised the appropriate hammer to the ribbon, leaving an inked impression of the character on the paper.

Though it's not the same thing with computers, it's easy to imagine some kind of invisible hammer raising itself to the screen when we press a key on the Apple's keyboard. But it's not that simple. In this session of bold truth, we're going to take a quick look at how all those characters get from your mind to the keys to the screen.

First, we'll look at how the display on your screen is related to what's in the computer's memory. We'll also look at how you (yes, you) can tinker around with what's inside the Apple's RAM. Finally, we'll find out how all those ABCs and 1, 2, 3s get on the screen where we can see them.

Up Periscope. The first thing we ought to understand is what the screen is showing us. The computer screen is sort of like a window; it's a window to what's going on inside the computer's memory. There are tens of thousands of memory addresses in your Apple, and the screen shows you what's inside just a few of them. Imagine, if you will, looking at the night sky through a telescope. Though you can see only a few stars, you know there are lots more outside of your viewing area. That small viewing area is comparable to what you see on your computer screen.

Certain areas of memory are devoted to displaying things on the screen. The screen lets you see what's going on in those areas.

Memory addresses in the Apple are numbered from 0 to 65535 ($0000 to $FFFF in hexadecimal). Picture the Apple's memory as a gigantic grid of 65,536 post office boxes; each one of these boxes represents a memory address, or one byte of memory.

Now let's suppose we are in charge of the post office. That means we can put things in, and look into, any box we choose. Well, almost. We can examine the contents of any memory address, but we can't put things into all of them. That's because part of the Apple's memory includes ROM, the contents of which aren't to be fooled with. A few months ago, we learned that ROM is where programs like the Monitor and the Applesoft interpreter reside. If any of these were tampered with (they can't be, so don't worry), all heck would break loose.

The best way to keep track of what things go where is to refer to each address by its number and not by what its function is. For the same reasons that the postman refers to boxes by their numbers and not by who's using them, we refer to memory locations by their addresses and not by what's stored there. Addresses (box numbers) stay the same, no matter what values are stored there (no matter who is using the post office box).

It's None of Our Business, but Who Cares? The way you look at a memory address is not much different from the way you look at anything you're not supposed to see—you peek at it. And it just so happens that *peek* is the word the computer understands. From Applesoft, type in the following:

```
PRINT PEEK (0)
PRINT PEEK (152)
PRINT PEEK (55300)
```

Print tells the Apple that you want it to display on-screen the result of whatever you type next. *Peek* tells it to look (take a peek) inside an address. And the number inside the parentheses is the address you're telling it to look at. You can use this *print peek* command with any number from 0 through 65535, which represent memory addresses.

The number that shows up when you hit return is the value that's currently residing at that address. Isn't it fun being nosey? We hope the postman doesn't do this sort of peeking into people's post office boxes to see what kind of mail they receive.

You're Gonna Poke Somebody's Byte Out! Putting things into memory addresses is not unlike sorting mail. The postal worker takes a piece of mail, figures out which box it goes in, and shoves it in there. For us, we figure out the value (byte) we want an address to hold, and we poke it in. All set to try a few? Here goes:

```
POKE 0,200
POKE 50,128
```

(You may notice some unusual behavior on the screen after this one. Type *normal* to make things work right again.)

```
POKE 39122,4
```

Poke tells the Apple that we want to change the value that's stored at a memory address. The first number tells which address to change, and the number after the comma is the value we want that address to hold. Though addresses are numbered up to 65535, we can change addresses only up to 49151; all addresses above that belong to the sacred realm of ROM. Don't touch anything there.

Depending on which addresses you're poking into and what values you're poking in, all sorts of weird stuff can happen. But let's not get too weird yet; let's get back to the original subject—how the Apple displays things on the screen.

The addresses between 1024 and 2047 are where the Apple stores values that decide what you see on the text and lo-res graphics screen (text and lo-res share the same area of memory, remember?). Here's an illustration of what we mean.

Our First Program. Type in the following short program. If you've never typed in an Applesoft program before, don't worry. It's really simple; just type it in exactly as you see it (don't worry about indenting). Include the line numbers and remember to hit the return key at the end of each line.

```
10  HOME
20  FOR A = 1024 TO 2047
30  POKE A, 128 * RND(1) + 128
40  NEXT A
```


All finished? Now just type *run* and watch the action. If you get the message *?syntax error in 10* or something similar to that, check the line number it tells you is wrong and make sure you typed it in exactly as it's shown. To correct it, just retype the line in question.

You may never need a program that does what this one does, but here's an explanation of what's going on. Line 10 clears the screen. Line 20 says we have a variable, A, that will represent all the integers between 1,024 and 2,047, beginning with 1,024 (we eliminate the commas in these numbers because commas are a no-no in programming). Line 30 performs the poke command, just like the one we learned. It goes to address A and pokes in a random number between 128 and 255. Don't worry about that silly math formula; all it does is generate the random number. Line 40 tells variable A to increase to the next number in the series that was set in line 20.

It's as though we typed:

```
POKE 1024, A
POKE 1025, A
POKE 1026, A
.
.
.
POKE 2047, A
```

where A is a random number. Geez, that's more than a thousand pokes! But that still doesn't explain how all that garbage got on the screen.

The Numbers Whence Garbage Was Born. The reason our random numbers were kept between 128 and 255 is that those numbers represent the letters and symbols on the keyboard. The numbers between 0 and 127 also represent characters, but they're a bit messier. When the program starts poking around, it begins with address 1024. Suppose it comes up with the random number 130, which stands for the letter B. It takes the value of 130 and pokes it into address 1024, which displays the letter B in the upper left-hand corner of the screen.

Next, it goes to 1025, generates another random number, pokes that value into address 1025, and, depending on the value, displays another character in the position on the screen next to our letter B. This nonsense continues until it reaches 2047 and pokes a value into that address.

(If you're on your toes you might have noticed a discrepancy here. There are 1,024 addresses from 1024 to 2047. But there are only 960 places to put characters on the screen: forty columns by twenty-four rows. What happened to the extra sixty-four addresses? Don't worry about it. Those extra addresses don't belong to the screen, so nothing shows up when values are poked into them.)

The way those values in memory are sent to the screen is pretty complex. But in a nutshell, what happens is that the computer scans through all the memory addresses several times a second. The values it finds in addresses 1024 through 2047 are translated into alphanumeric characters according to the ASCII code. ASCII (pronounced *askee*) stands for American Standard Code for Information Interchange.

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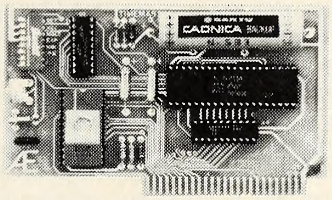

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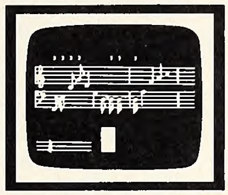

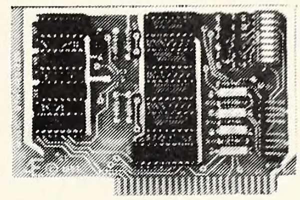

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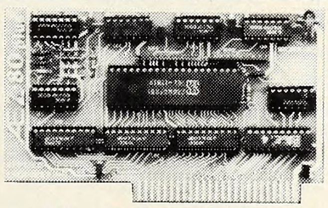

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an idea how the computer translates ASCII code into something we can read, try out the following program. Type *new* to delete the previous program, and enter this short one.

```
10  HOME
20  FOR X = 0 TO 255
30  POKE 1024 + X, X
40  NEXT X
```

This one works almost like the previous one, but instead of poking in random numbers it pokes in the numbers from 0 to 255 in order. When you run the program you'll see that numbers 0 through 63 create inverse characters, black characters on a white background. The next sixty-four numbers create flashing characters, and the final 128 values—from 128 to 255—create characters in normal display.

If you have an *Apple II Reference Manual* handy, turn to page 8, where you'll see a table that shows all the Apple's characters and their corresponding ASCII codes. The way you figure out the codes is simple. Find the character whose code you wish to know, take the number at the top of its column, and add it to the number at the left side of the character's row. For example, to find the code for the letter M, add the number at the top of the column (192) to the number at the left-hand side of the row that M is in (13); M's ASCII code is 205.

For owners of the *Apple IIe Reference Manual*, you don't have to add anything. On page 16 there's a table with all the ASCII characters and their corresponding codes, 0 through 127, next to them.

Wait a Sec. Why do the ASCII codes in the II's reference manual run from 128 to 255, and the IIe's from 0 to 127? Here's where things get unbelievably interesting. Now we get to integrate all that binary and hexadecimal stuff we learned about last month.

We know that with an eight-bit byte we can generate 256 values (0 to 255). But the Apple generates only 128 characters. In reality, it's only the first seven bits that are used to create characters. The eighth, leftmost bit just sort of sits there until it's called on for something else that we'll get to in a moment. Here's a short program that will help illustrate what's going on (don't forget to type *new* before entering this program).

```
10  HOME
20  SPEED = 150
30  FOR X = 0 TO 255
40  PRINT X, CHR$(X)
50  NEXT X
60  SPEED = 255
```

The program runs by pretty fast, but you can hit control-S to stop and start it at will. Control-C will stop the program permanently. When you run this program, the left-hand column shows the ASCII code, and the right-hand column displays its corresponding character. For the first thirty or so codes, you won't see any characters. That's because most of them represent control characters, which are invisible. Starting with ASCII code 33, you'll see various punctuation symbols followed by the alphabet. If your Apple can display lower-case letters, you'll see those from codes 97 to 122; if you don't have lower case, those codes will look like reruns of the punctuation symbols.

But beginning with ASCII code 128, we see the whole sequence of characters all over again. What's going on? Did the people who thought of this system run out of ideas for characters? Well, no.

Concentrate—It Gets Confusing Here. The Apple uses only the first seven bits in a byte to generate characters. That means only the bytes from 00000000 to 01111111 are used (that's the unemployed eighth bit on the far left). These represent ASCII codes 0 through 127. The ASCII codes 128 through 255 are represented by bytes 10000000 through 11111111 (now that eighth bit is employed). Here's what's going on.

A		B
01001000	and	11001000
01000101	and	11000101
01000011	and	11000011
01001011	and	11001011

Table of Paired Bytes

Consider the bytes in the accompanying table. Notice any similarities within pairs? Each one on the right side is the same as its partner on the left, except that it has a 1 instead of a 0 in its left-hand (eighth) column. Whether this bit is a 0 or a 1 makes little difference to us, but it makes a big difference to the computer.

In column A, those bytes represent the ASCII codes for the letters H, E, C, and K respectively. So do the bytes in column B. It sure seems dumb to have two codes that represent the same letter, but we needn't get too upset; the computer has its reason for requiring two ASCII codes for each character.

When you press a key on the keyboard, you're sending the ASCII code for that key to location 49152. At the same time, the eighth bit of that code is set "on," which tells the computer that a key has been pressed. An input routine in the Monitor scans that address, acting upon whatever it finds there. When it sees that you've put an ASCII code there by hitting a key, it takes note of it and switches the eighth bit to "off." That's all the eighth bit does; it tells the computer if the ASCII value it's looking at is there because somebody hit a key or if it was there since the last time the computer looked at that address.

Neon Signs, Flashy Lights, and Other Ways To Gain Attention. To illustrate, suppose we're typing merrily along. When we hit the A key, for example, the ASCII code 193 goes flying into memory with its eighth bit on, shouting "Hey, buddy, this key's been pressed!" When the 6502 looks at 49152, it sees the 193 sitting there, puts the letter A on the screen, and flips the eighth bit into its "off" position. That's its way of saying, "Okay, I hear you already. Now shaddap!"

The Apple has to know if the bytes in memory represent keys that have just been hit because that's how it figures out what to do. Let's say we're running a program that fires a cannon at your neighbor's house every time the left arrow key is pressed. When you hit the left arrow, the computer sees that eighth bit on, telling it that someone has just hit the left arrow. It takes note of the fact, flips the eighth bit off, and tells the program to fire the cannon. The next time the 6502 scans that address, if no one has hit the left arrow, the computer still sees the ASCII code for the left arrow at that memory address; but, because the eighth bit is off, it knows no one has hit it since the last time, so it doesn't fire the cannon.

Now let's suppose the computer couldn't tell if a key had just been pressed or not. When it sees the ASCII code for the left arrow, it goes and tells the program to fire the cannon. The next time around, it still sees the same ASCII code there and thinks it's supposed to fire the cannon again, even if no one has hit a key. To the computer, the left arrow key equals "Fire the cannon." The result is that thousands of cannonballs are being launched at your neighbor's house every second when you meant to fire only one.

This example is a little extreme, but the importance of having two sets of ASCII codes for one set of characters should be a little clearer. (By the way, there's probably nothing illegal about writing programs that fire cannons at your neighbors' houses. However, laws pertaining to executing such programs might vary from state to state, so it's a good idea to check on these things before going whole hog at it.)

Phew! Here at Last. That's basically how things work between the time you press a key and the time something shows up on the screen. There are all sorts of weird phenomena that occur at the keyboard ("Why is it that when I press the A, S, D, and F keys all at once, it shows up as 'FD2SJA' or some variation of those characters?") that are best left for experts to explain; that's their job. Our job is to find those experts and make them sweat by asking them hard questions like that. ■

TRADETALK

☐ **Synapse Software** (Richmond, CA) staged a dramatization of its *Blue Max* World War I aerial combat game at a press premiere in late August. The event was designed to re-create the barnstorming atmosphere of a 1920s fairground picnic and air show. Highlights of the day included mock dogfights and aerobatics by pilots in vintage biplanes, visitor rides on the planes, and on-the-ground demonstrations of the game.


A veteran aviator toasts the flying success of Ihor Wolosenko, president of Synapse Software (left), and Ken Grant, Synapse's vice president and chairman of the board (right).

☐ **Sierra On-Line** (Coarsegold, CA) has revealed that **Warner Publishing** (New York, NY) offered to buy a controlling interest in the company earlier this year. According to **John Williams**, Sierra On-Line's entertainment product manager, **Albert B. Litewka**, president of Warner Software, offered Sierra On-Line an undetermined sum of between $10 million and $30 million for 50 percent of the company. Sierra On-Line broke off negotiations in June. "We are an entrepreneurial company and weren't sure we were ready for that kind of control. It would take the fun out of things," Williams said.

☐ Maps and InvisiClues once provided by the discontinued **Zork Users Group** (Milwaukee, WI) will be provided by **Infocom** (Cambridge, MA), said **Michael R. Dornbrook**, founder of the user group. Infocom will sell the items at cost, making them less expensive than when they were available through the user group. Dornbrook, who said that he will miss the *Zork* group, has been named product manager for entertainment software at Infocom.

☐ **Apple Computer** (Cupertino, CA) and **ITT Industrial Credit** (Saint Paul, MN) have introduced a computerized lease-processing program for businesses that will speed up credit approval and dealer payment, said **Michael Disch**, vice president and director of ITT Industrial Credit's automated finance and lease division. The new system evaluates credit while the customer waits and allows dealers to be paid immediately from an ITT account. Customer payments then reimburse ITT. Dealers can access the system by modem and will reach an ITT computer that searches credit data banks and transmits information back to the credit officer. To be approved, leases must include an Apple computer but may also include Apple-compatible equipment and software.

☐ **ComputerLand** (Hayward, CA) has reorganized its executive structure to fit its size, said **William Millard**, chairman and founder of ComputerLand. **Edward E. Faber** is continuing as chief operating officer, as well as becoming vice chairman. In addition, the corporation has been separated into four divisions, each with its own president. Division presidents are **Michael Shabazian**, formerly a senior vice president and now head of ComputerLand United States; **Michael McConnell**, formerly a senior vice president and now president of ComputerLand International; **Kenneth Waters**, formerly operations vice president and now president of ComputerLand Corporate Policy Division; and **Barbara Millard**, daughter of William Millard and president of IMS Associates, the Millard family holding company. Barbara Millard is now president of the ComputerLand corporate services division. Millard's mother, **Patricia Millard**, has been appointed a member of the corporate management committee, which provides overall direction for the company. The other members are Faber and William Millard.

ComputerLand has also launched a retail credit program in conjunction with **Citibank** (New York, NY). The cobranded ComputerLand credit card allows qualifying customers to finance an initial purchase of $1,500 or more. After that, customers can finance purchases that exceed $100. Cardholders have thirty days to repay the Citibank loan and are charged a $20 minimum monthly fee. Customers can apply by phone at participating ComputerLands and will receive a response within one hour. They can also send completed applications to Citibank for a response within thirty days.

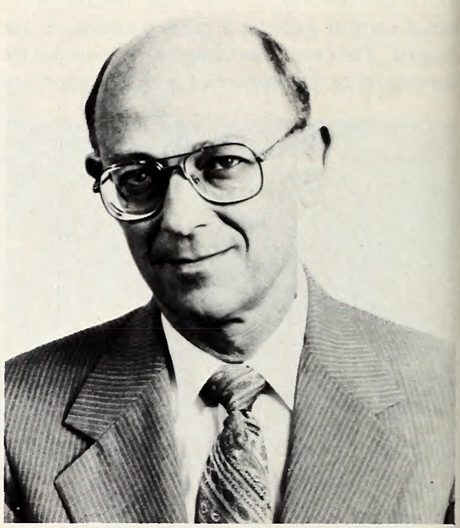
☐ **John Brockman Associates** (New York, NY), a literary and software agency, has announced the appointment of **John C. Dvorak** to the newly created position of technical advisor.

Dvorak, formerly the editor of *InfoWorld*, was appointed to assist the agency in opening new markets and channels of distribution for software developers and their products. "Dvorak is the necessary interface, an industry insider whose expertise will be invaluable to this agency, its clients, and its customers," said **John Brockman**, president of John Brockman Associates.

☐ **Thomas Measday**, former vice president and general manager of Yardley of London, has joined **Broderbund** (San Rafael, CA) as its vice president of marketing and sales. According to **Doug Carlston**, president of Broderbund, "Measday's impressive accomplishments in the toiletries field span management, creative development, advertising, and promotion. He implemented a restructuring program at Yardley that reversed ten years of unprofitable operations, only one indication of Measday's many talents."

☐ **Program Design** (Greenwich, CT), a publisher of educational software, has announced the completion of a study to determine the effects of computerized teaching aids on preschool children. The study, which was commissioned by PDI and supervised by preschool educators, observed twenty children (ten with computers and ten without) from the same socioeconomic background in Stamford, Connecticut. Children were chosen from the same background to eliminate the effect of cultural differences, said PDI president **John Victor**. Victor said that the results strongly justified the use of computers in preschool education. Children working with computers made a gain of 47.4 percent in skills tests, while those without computers gained only 13.5 percent. The computer group also gained in confidence and the ability to make decisions, Victor said.

☐ The board of directors of **Source Telecomputing** (McLean, VA) has appointed **Bert Helfinstein** president and chief executive officer,



Bert Helfinstein, president and chief executive officer of Source Telecomputing.

replacing **George Grune**, who is now chairman of the board. Helfinstein, former president of software publisher CGI Systems, will report directly to Grune. "Bert Helfinstein has twenty years of proven success in computer-related businesses, ten of those in top management. Equally important is the great enthusiasm that Bert has for his work and the vision he shares with us for the growth and success of STC," Grune said.

☐ As part of an effort to utilize talent from outside the computer industry, **Electronic Arts** (San Mateo, CA) has signed cartoonist **Gahan Wilson** and basketball stars **"Dr. J" (Julius) Erving** and **Larry Bird** to help design entertainment programs. Erving and Bird are helping Electronic Arts capture the sport of basketball in a computer game, while Wilson is helping game designers translate his sense of humor to electronic media. Cartoons by Wilson have appeared in *Playboy*, the *New Yorker*, *Punch*, and *Paris Match*, among other publications. Larry Bird plays for the Boston Celtics and Dr. J for the Philadelphia '76ers. Their on-court rivalry will continue on monitors this fall when Electronic Arts's basketball game is released.

☐ **Barney Stone**, founder of **Stoneware** (San Rafael, CA), has formed **Stone Edge** (Philadelphia, PA), a software development firm. The new company is concentrating on development of *DB Master*-related products, Stone said. In the works are a translator that will convert files from *VisiFile* and *PFS:File* into *DB Master* files, a *DB Master* programmer's package, and a word processor that will be compatible with *DB Master*. Stone is also working on what he termed a new gaming concept, but declined to elaborate. ■

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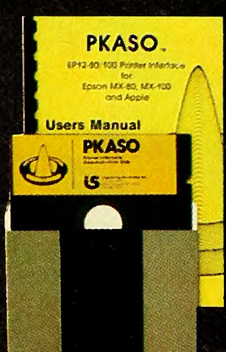

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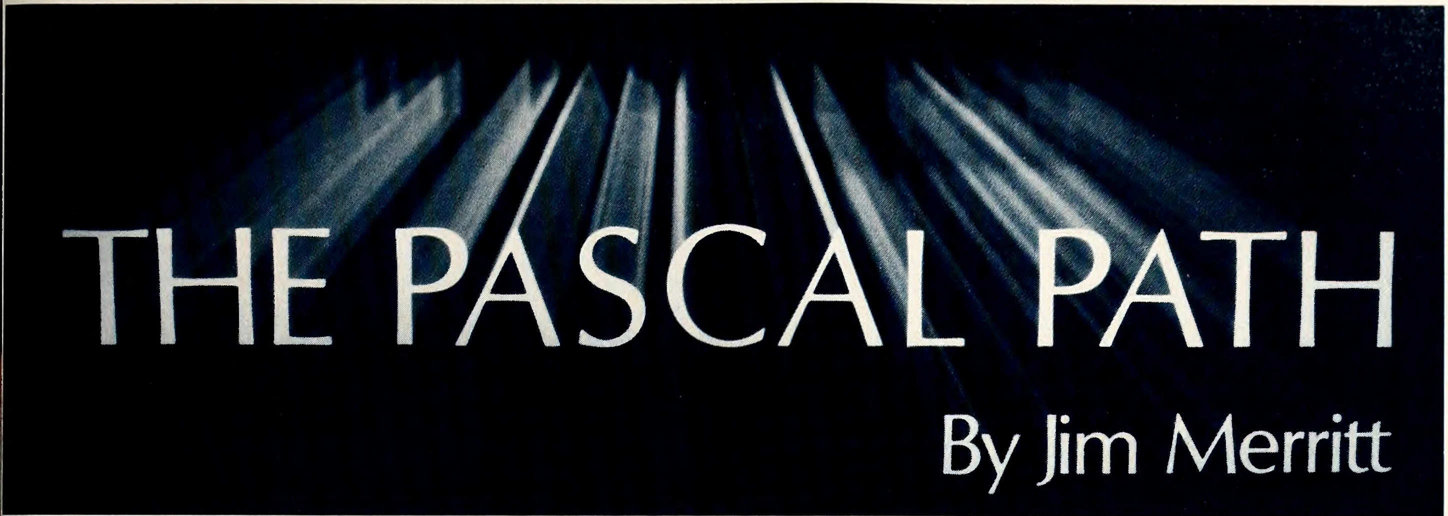

Jungle Fever, Part 8

When we discussed the Pascal compiler's source file inclusion facility last April, we noted that it permits you to maintain libraries of frequently needed subroutines in the form of text files. For instance, the ubiquitous function Capital, which converts a lower-case alphabetic character to the corresponding upper-case one, could be kept in a text file named CAPITAL.TEXT. Once this text file existed, it would no longer be necessary to embed the full definition of Capital directly into the source text for each new program. Instead, the compiler directive

```
(*$I CAPITAL*)
```

could act as a place marker for the function definition. While scanning a program, the compiler would then replace the $I directive with the actual contents of the CAPITAL.TEXT file. It would be as if the definition of the function actually existed in the program source text at the site of the $I directive.

It is certainly quicker and easier to build a bookshelf from a kit of manufactured parts than to start with raw timber. By the same token, it is quicker and easier to build reliable programs from a library of pretested subroutines than it is to write all of the code from scratch.

Unfortunately, the file inclusion facility provides at best a shaky foundation for the management of subroutine libraries. It is far better to maintain libraries in the form of object code instead of source text. For one thing, the source file for a given subroutine usually occupies far more disk space than the corresponding object file. In other words, a disk can accommodate a larger library if the routines are stored as object code. Furthermore, it is a waste of time to bother recompiling library routines on behalf of every program that uses them. Once they operate efficiently and are free of errors, library routines should never be recompiled. As we'll see, the Apple Pascal system is able to inject object code from a library file into that of a newly compiled program that uses library routines. Linking a program to its library subroutines at the level of object code turns out to be a much faster process than merging source files during compilation, primarily because object code (p-code) is much more thoroughly condensed and "digestible" than source text.

Apple Pascal permits you to group together not only subroutines but also data definitions and variable declarations in the form of a UNIT. These objects may be used by the UNIT's *clients*, which may be PROGRAMs or even other UNITs. A *library* consists of one or more UNITs in a single code file.

UNIT Structure: A Practical Example. UNIT CharTools, shown in listing 1 at the end of this article, provides its clients with several constants and subroutines that are useful in dealing with Char data. CharTools is representative of the typical UNIT.

As indicated by the syntax diagrams of figure 1, any UNIT may include subroutines (procedures and functions), variables, data constant and type definitions, or a combination of any or all of these. CharTools defines only two constants and several subroutines.

Like most UNITs, CharTools consists of two sections, the INTERFACE and the IMPLEMENTATION. As a menu lists the dishes that a restaurant is prepared to serve, so CharTools's INTERFACE section lists the objects that this UNIT provides to its clients. A client may access the INTERFACE section's variables, make use of its constants and data types, and call its subroutines just as if these objects had been defined in the client's own global declaration area. (The reverse is not generally true, however. In particular, a separately compiled UNIT cannot use objects from within the client unless, for instance, the client supplies them as actual VAR parameters to one or more of the UNIT's subroutines.) A computer scientist would say that the items declared in an INTERFACE section are *public*.

The information given in an INTERFACE section tells a programmer the nature of any data objects that will be shared between the UNIT and a client, as well as the names and calling conventions for any subroutines provided by the UNIT. In general, the INTERFACE section specifies only what the UNIT does, not how it works. When you write a client program, you will have little or no need to know (for instance) exactly how the library package's subroutines work. Instead, you will be more concerned with calling the subroutines from your own code. You will need to know the names and purposes of any procedures or functions provided by a UNIT, as well as the number and types of parameters that these subroutines expect. You may also be concerned with the execution speed of one or more routines. But as long as a particular subroutine performs a useful function at an acceptable level of efficiency, you probably won't care how it does its job.

The IMPLEMENTATION section is a UNIT's "kitchen." Here are defined all subroutines declared in the INTERFACE. Any public data declared in the INTERFACE is known and available to objects defined in the IMPLEMENTATION section. However, additional subroutines and data not mentioned in the INTERFACE may also be defined as part of the IMPLEMENTATION. These *private* objects cannot be "seen" or used by the UNIT's clients, in the same way that the chef, her assistants, and the kitchen itself remain unobserved by the typical restaurant patron. In its current incarnation, CharTools does not define any private data or subroutines. The only items defined in CharTools's IMPLEMENTATION section are the bodies of the public subroutines.

When we investigated SEGMENT subroutines last month, we found it necessary to separate subroutine declaration from subroutine definition in certain special situations. We saw how to use the keyword FORWARD to achieve such separation. In a UNIT, subroutines mentioned in the INTERFACE are *implicitly* declared as FORWARD. So, even though the keyword FORWARD is never used in the INTERFACE, you must *define* public subroutines according to the rules for subroutines declared FORWARD. In the INTERFACE, the complete PROCEDURE or FUNCTION heading must be given, along with a complete parameter list and FUNCTION-result type, if any. When a public subroutine is *defined* in the IMPLEMENTATION, it is introduced by an *abbreviated* form of subroutine heading, which consists of the keyword PROCEDURE or FUNCTION, as appropriate, followed only by the subroutine name and a semicolon. In the INTERFACE declaration of Capital, for instance, note the presence of a full parameter list and result

type. Now, look at the IMPLEMENTATION definition of Capital. At first, you might think that the parameter list and result type have been repeated, contrary to the rule just mentioned. But look more closely. All the information between the name of the subroutine and the semicolon that terminates the subroutine heading is contained within a *comment*. Inveterate programmers would probably say that the redundant parameter list and result type have been "commented out." Preserving an "echo" of a subroutine's full heading in the IMPLEMENTATION section is a good idea, because it helps you remain aware of the true nature of the routine while you are writing (or reading) it.

Following the subroutine DigitValue are the keyword END and a period. This couplet concludes not only the IMPLEMENTATION section but also the CharTools UNIT itself.

Writing a Client. A UNIT is clearly similar to a PROGRAM. Yet, there are crucial differences. For one thing, most PROGRAMs are self-contained; they can function independently of other software. Thus, you may execute them directly. On the other hand, any code in a UNIT must be invoked by a client. This being so, we must write a client for CharTools if we expect to use any of its subroutines. Listing 2 presents the PROGRAM CTTest, which you may use to estimate the execution speed of most of the subroutines in CharTools.

Three things are remarkable in this compiler-generated listing of an otherwise undistinguished client program.

First, access to the objects defined in CharTools is made possible through the USES declaration. This declaration consists of the keyword USES, followed by a list of identifiers that name the UNITs that the client employs, then a semicolon. For CTTest, the USES declaration contains only one identifier, CharTools.

Second, the compiler directive instruction $U, followed by a file name as argument, tells the compiler to look for compiled UNITs in the specified file. If this instruction did not appear in the CTTest source text file prior to the identifier CharTools, the compiler would try to find CharTools in the file *SYSTEM.LIBRARY. This search would fail, and the compiler would report an instance of error #190 ("Unit not in library").

The last thing to notice about the listing of CTTest is that the INTERFACE to CharTools has been inserted automatically by the compiler. This source code does not exist in the file CTTEST.TEXT! Whenever a

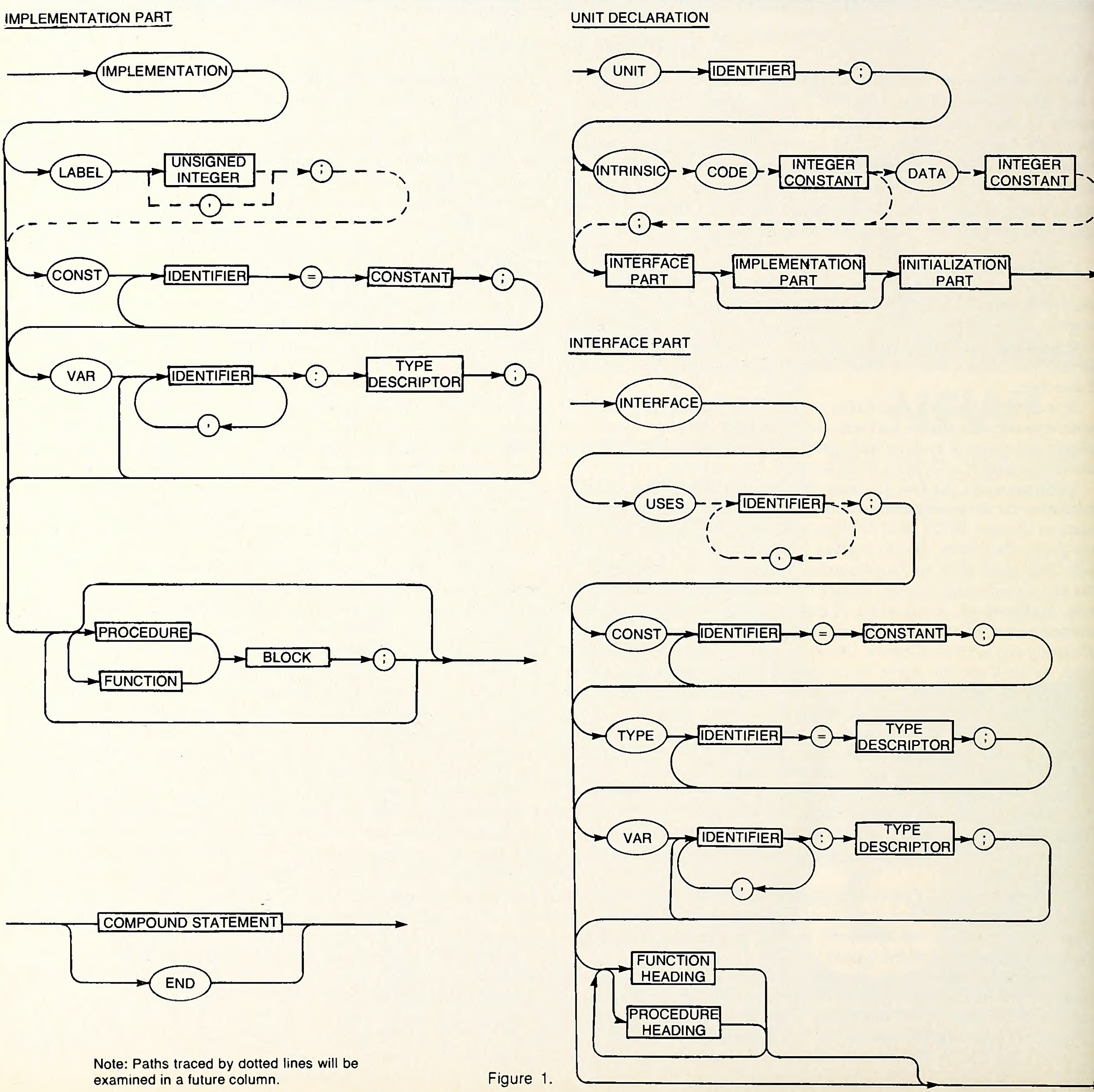

Figure 1.

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client USES a UNIT, the compiler includes the INTERFACE text for that UNIT in any listing it generates. The region of CTTest that includes the $U compiler directive and the USES declaration actually looks like this:

```
PROGRAM
   CTTest;

   USES
      (*$U CharToolsA.CODE *) (* file contains following UNITs: *)
         CharTools;

   CONST
      VersionMark =
         'CTTEST: Test CharTools (V1 / 16-Aug-83)';
```

The Linking Process. If you try to execute the CTTEST.CODE file immediately after compilation, the Pascal system will issue this error message:

```
Must L(ink first
```

This situation occurs because the compiler does not automatically merge the object code for CharTools into that for CTTest (although life might be much simpler if it did). Instead, you must use a special utility program, the *Linker*, to combine the two into an executable code file.

To invoke the Linker, press the L key when you see the system's main prompt line. The Linker will ask you to supply a series of file names, indicating the files that contain the object code to be merged. Finally, it will ask you to specify the name of an output file, into which it will deposit the merged (and presumably executable) object code. Here is the dialogue that your Pathfinder had with the Apple III Linker in order to merge the CTTest client program with the UNIT CharTools:

Apple III Pascal Linker [1.1]
Host file? CTTEST *return*
Opening CTTEST.CODE
Lib file? CHARTOOLS *return*
Opening CHARTOOLS.CODE
Lib file? *return*
Map file? *return*
Reading CTTEST
Reading CHARTOOL
Output file? CTA.CODE *return*
Linking CHARTOOL # 7
Linking CTTEST # 1

The Apple II Linker is so close to the Apple III version that you may consider this dialogue as representative of them both. Note that the user's responses to the Linker must all end with a tap of the return key, as noted in italics.

The Host file is the focus of the linking process. It is object code that relies on outside resources that must be linked to it in order to produce an executable code file. In this case, the Host is CTTest, contained in the file CTTEST.CODE. The code in a Host file may be linked to code from one or more Lib files. The Linker will continue to ask for a Lib file until you respond to its request by pressing only the return key. In our example, the only Lib file necessary was CHARTOOLS.CODE.

Notice that, in specifying the Host file and Lib file, you do not have to include the .CODE suffix. The Linker seems to append the suffix automatically. In truth, the Linker first tries to open files named CTTEST and CHARTOOLS without appending any suffixes. Since no such files exist, this strategy fails. The Linker then appends the .CODE suffix to each file name and tries again, this time successfully. Note that the Linker reports the name actually used in opening each file.

The Map is a text file, the contents of which summarize the results of the Linking process and illustrate the segmentation of the final object code. The information given in a link map is not relevant to the present discussion but will be covered in a future column. Usually, you will not want the Linker to produce a Map file. To dispense with it, as was done in the example, press only the return key when the Linker asks for a Map file name.

Once you have specified the Host, Lib, and Map file names, the Linker examines the Host, then searches the Lib files for the UNITs or other modules that the Host code requires in order to be complete. In the example dialogue, this process was indicated by the Reading CTTEST and Reading CHARTOOL output messages.

Finally, you are asked to specify an Output file. The Linker will deposit the linked object code in the file you name. Apple II owners should answer this question with care. If you want the destination to be a code file, you must include the .CODE suffix in the Output file name. For instance, if you answer CT to this input prompt, the Apple II (version 1.1) Linker will create a file named CT, then fill it with linked object code. The only way to produce a file named CT.CODE is to respond to the prompt for an output file with the complete file name CT.CODE. Apple III owners should note that their version of the Linker automatically appends .CODE to the output file name if that suffix isn't already present. (To defeat this behavior, end the output file name with a period. The Linker will remove the period from the file name but add no suffix.)

Linked output was directed to the file CTA.CODE in the example, because you will soon need the incomplete object code for another experiment. However, you might just as easily tell the Linker to replace the incomplete object code with the executable version, by specifying CTTEST.CODE as the output file name.

As soon as it knows where to put the linked code, the Linker can proceed to merge all of the pieces of a program together. All library routines are linked first, then the client's main program body. This is indicated, in our example, by the messages "Linking CHARTOOL # 7," and "Linking CTTEST # 1." Notice that, in both the "Reading" and "Linking" messages, the UNIT name, CharTools, was truncated to a length of eight characters. This reflects the fact that the Pascal compiler itself recognizes only the first eight characters of any identifier. Throughout compilation, linkage, and execution, the system deals with "UNIT CharTool," *not* CharTools!

Execution! The CTTest program was designed to help you measure the execution speed of several of the CharTools routines, given "favorable" and "unfavorable" parameters to each. Have a stopwatch ready and start it as soon as you press the return key to begin a particular test. Stop the watch as soon as you hear the beep that indicates the conclusion of a test. The number of loop repetitions has been chosen so that each test will take several seconds, rendering the results acceptably precise despite reasonable variations in your reaction time. Figure 2 lists

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the results obtained by your Pathfinder while executing the program on his Apple III. (To paraphrase a warning from the automobile business, "Use these numbers for comparison; your computer's performance may vary.")

Capital('0')	21.71
Capital('a')	21.74
Alphabetic('0')	21.16
Alphabetic('a')	20.98
Alphanumeric('0')	21.10
Alphanumeric('a')	20.98
DigitVal('0')	22.83
DigitVal('a')	22.21

Figure 2. Execution times for certain CharTools (v 1.0) subroutines (all times listed in seconds).

Modifying a UNIT. Several of CharTools's subroutines use SET-constructor expressions within tests for SET inclusion. You may wonder how efficient this method is. Take it from your Pathfinder that, where SET operators are used, they execute much more quickly than comparable comparison-based expressions. However, we might be able to tune these routines for even faster performance by replacing SET-constructors with precalculated SET *variables*. We have already seen that the values of SET-constructors are computed during execution, in much the same way as arithmetic expressions are. It seems reasonable to assume that we might assign fixed values to a small group of SET variables that are private to CharTools and refer to them in the bodies of the public subroutines. Since the "Char SET" values would be computed only once, some execution time should be gained.

Listing 3 shows a new version of CharTools that has been modified according to our scheme. Note the addition of the private variables, A and AN, as well as the "initialization body" at the bottom of the UNIT. A and AN cannot be accessed by any client; only CharTools knows anything about them. These variables also exist independently of any client. Throughout the execution of a client, the values contained by these variables will remain unchanged unless and until reset by code within CharTools.

The "initialization body" in the new CharTools replaces the solitary END keyword that had marked the end of the original UNIT. When the client program is executed, this body of code will be executed before any client code. Thus, it is a perfect means for initializing a UNIT's private variables.

Probably the most important thing about the new CharTools is that its INTERFACE is virtually identical to that of its predecessor. Only the commentary varies between the two INTERFACE sections, and that amounts to no practical difference at all. Indeed, the Pascal compiler will view the pair as identical twins, since it ignores any comments that are not compiler directives anyway.

Save the source text of the new CharTools in a file named NCharTools so that you will still have the original for future use. Then, compile the new file. You may go ahead and link NCHARTOOLS.CODE directly to CTTEST.CODE, even though the $U instruction in CTTest's source implies that the CharTools UNIT is to be found in CHARTOOLS.CODE. This trick is possible only because the names and INTERFACEs of the two UNITs are functionally identical. Put the linked code in the file CTB.CODE and execute it.

Executing a CTTest that uses the new version of CharTools yields the curious results shown in figure 3. The old CharTools appears to be significantly faster than the new! Even your Pathfinder was amazed to find that using the value of a SET-constructor (which, presumably, is recomputed every time the constructor is referenced) is actually quicker than reading the preset value of an unvarying SET variable.

Routine	Time	Net Change from v 1.0
Capital('0')	21.64	(−0.07)
Capital('a')	21.65	(−0.09)
Alphabetic('0')	23.19	(+2.03)
Alphabetic('a')	23.09	(+2.11)
Alphanumeric('0')	23.12	(+2.02)
Alphanumeric('a')	23.08	(+2.10)
DigitVal('0')	22.81	(−0.02)
DigitVal('a')	22.38	(+0.17)

Figure 3. Execution times for certain CharTools (v 1.1) subroutines (all times listed in seconds).

For Those Who Don't Like Vanilla. One of the most important criticisms of the Apple Pascal system is that the user must work with (and understand the operation of) too many different system components in order to produce even a simple program. This situation is only aggravated once you begin to create and employ UNITs, for then you must learn to use yet another part of the system, the Linker. Whenever you recompile a UNIT's client you must also relink the object code that the compiler produces before the system will allow you to execute it. If you recompile a UNIT, you must, at the very least, relink each of its PROGRAM clients. (Of course, whenever the INTERFACE part of a UNIT changes, you must also recompile *all* clients.) More than one programmer has slammed clenched fist to tabletop at the frustrating necessity of invoking the Linker so often. Fortunately, several of these programmers happened to be the designers of Apple Pascal! To alleviate the problem, they created a second kind of package—an INTRINSIC UNIT—that may reside in a central system "library file" and that may be linked to its client by the Pascal system automatically at execution time. To explore the advantages and disadvantages of INTRINSIC UNITs, as well as study a few of the subtler aspects of "regular" UNITs, don't miss next month's *Softalk*.

Listing 1.

```
1  1 1:D    1  UNIT
2  1 1:D    1     CharTools;
```

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```
 1 1:D   1 (* Various tools that are useful for
 1 1:D   1    manipulating Char values.
 1 1:D   1
 1 1:D   1    VERSION 1.0: 15 August 1983
 1 1:D   1 *)
 1 1:D   1
 1 1:D   1
 7 1:D   1 INTERFACE
 7 1:D   1   CONST
 7 1:D   1       Blank=       ' ';
 7 1:D   1
 7 1:D   1       NoDigit=    -MaxInt;
 7 1:D   1
 7 1:D   1   FUNCTION
 7 2:D   3      Capital(Ch
 7 2:D   3                       :Char)
 7 2:D   4          :Char;
 7 2:D   4   (* Return Ch, converted to upper case
 7 2:D   4      (capital), if Ch is lower case. *)
 7 2:D   4
 7 1:D   4   FUNCTION
 7 3:D   3      LowerCase(Ch
 7 3:D   3                          :Char)
 7 3:D   4          :Char;
 7 3:D   4   (* Return Ch, converted to lower case
 7 3:D   4      if Ch is capital alphabetic. *)
 7 3:D   4
 7 1:D   4   FUNCTION
 7 4:D   3      ASCII(Ch
 7 4:D   3                    : Char)
 7 4:D   4          :Char;
 7 4:D   4   (* Return Ch, translated to ASCII range.
 7 4:D   4      In other words, clear the high bit of Ch
 7 4:D   4      and return the result.
 7 4:D   4   *)
 7 4:D   4
 7 1:D   4   FUNCTION
 7 5:D   3      Alphabetic(Ch: Char)
 7 5:D   4        :Boolean;
 7 5:D   4   (* Return True iff Ch is an alphabetic character. *)
 7 5:D   4
 7 1:D   4   FUNCTION
 7 6:D   3      Digit(Ch: Char)
 7 6:D   4        :Boolean;
 7 6:D   4   (* Return True iff Ch is a numeric character. *)
 7 6:D   4
 7 1:D   4   FUNCTION
 7 7:D   3      AlphaNumeric(Ch: Char)
 7 7:D   4        :Boolean;
 7 7:D   4   (* Return True iff Ch is either alphabetic or numeric *)
 7 7:D   4
 7 1:D   4   FUNCTION
 7 8:D   3      DigitValue(Ch: Char)
 7 8:D   4        :Integer;
 7 8:D   4   (* Return Integer value represented by Ch if Ch is
 7 8:D   4      a digit; otherwise return NoDigit.
 7 8:D   4   *)
 7 8:D   4
 7 1:D   4 IMPLEMENTATION
 7 1:D   1
 7 1:D   1   FUNCTION
 7 1:D   3      Capital(* Ch
 7 1:D   4                     :Char)
 7 2:D   4          :Char *);
 7 2:D   4   (* Return Ch, converted to upper case
 7 2:D   4      (capital), if Ch is lower case. *)
 7 2:0   0   BEGIN (* Capital *)
 7 2:1   0      Capital := Ch; (* No change unless lower case *)
 7 2:1   3      IF ((Ch >= 'a') AND (Ch <= 'z'))
 7 2:1  10        THEN (* it's a lower-case letter — transform it! *)
 7 2:2  12           Capital := Chr(Ord(Ch) - Ord('a') + Ord('A'));
 7 2:2  19        (* Otherwise, it's not a lower-case letter, so leave
 7 2:2  19           it alone. *)
 7 2:0  19   END    (* Capital *);
 7 2:0  32
 7 1:0  32   FUNCTION
 7 1:D   3      LowerCase(* Ch
 7 1:D   4                         :Char)
 7 3:D   4          :Char *);
 7 3:D   4   (* Return Ch, converted to lower case
 7 3:D   4        if Ch is capital alphabetic. *)
 7 3:0   0   BEGIN (* LowerCase *)
 7 3:1   0      LowerCase := Ch; (* No change unless capital *)
 7 3:1   3      IF ((Ch >= 'A') AND (Ch <= 'Z'))
 7 3:1  10        THEN (* it's a capital letter — transform it! *)
 7 3:2  12           LowerCase := Chr(Ord(Ch) - Ord('A') +
                        Ord('a'));
 7 3:2  19        (* Otherwise, it's not a capital letter, so leave it
 7 3:2  19           alone. *)
 7 3:0  19   END    (* LowerCase *);
 7 3:0  32
 7 1:0  32   FUNCTION
 7 1:D   3      ASCII(* Ch
 7 1:D   4                   : Char)
 7 4:D   4          :Char *);
 7 4:D   4   (* Return Ch, translated to ASCII range.
 7 4:D   4      In other words, clear the high bit of Ch,
 7 4:D   4      and return the result.
 7 4:D   4   *)
 7 4:D   4     CONST
 7 4:D   4        HighBit=    128;
 7 4:0   0   BEGIN (* ASCII *)
 7 4:1   0      ASCII := Chr(Ord(Ch) MOD HighBit);
 7 4:0   7   END    (* ASCII *);
 7 4:0  20
 7 1:0  20   FUNCTION
 7 1:D   3      Alphabetic(* Ch: Char)
 7 5:D   4        :Boolean *);
 7 5:D   4   (*Return True iff Ch is an alphabetic character. *)
 7 5:0   0   BEGIN (* Alphabetic *)
 7 5:1   0      Alphabetic := (Ch IN ['A'..'Z', 'a'..'z']);
 7 5:0  24   END    (* Alphabetic *);
 7 5:0  36
 7 1:0  36   FUNCTION
 7 1:D   3      Digit(* Ch: Char)
 7 6:D   4        :Boolean *);
 7 6:D   4   (* Return True iff Ch is a numeric character. *)
 7 6:0   0   BEGIN (* Digit *)
 7 6:1   0      Digit := ((Ch >= '0') AND (Ch <= '9'));
 7 6:0   9   END    (* Digit *);
 7 6:0  22
 7 1:0  22   FUNCTION
 7 1:D   3      AlphaNumeric(* Ch: Char)
 7 7:D   4        :Boolean *);
 7 7:D   4   (* Return True iff Ch is either alphabetic or numeric.
                *)
 7 7:0   0   BEGIN (* AlphaNumeric *)
 7 7:1   0      AlphaNumeric := (Ch IN ['0'..'9', 'A'..'Z', 'a'..'z']);
 7 7:0  24   END    (* AlphaNumeric *);
 7 7:0  36
 7 1:0  36   FUNCTION
 7 1:D   3      DigitValue(* Ch: Char)
 7 8:D   4        :Integer *);
 7 8:D   4   (* Return Integer value represented by Ch if Ch is
 7 8:D   4      a digit; otherwise return NoDigit.
 7 8:D   4   *)
 7 8:0   0   BEGIN (* DigitValue *)
 7 8:1   0      IF ((Ch >= '0') AND (Ch <= '9'))
 7 8:1   7        THEN
 7 8:2   9           DigitValue := (Ord(Ch) - Ord('0'))
 7 8:1  12        ELSE
 7 8:2  16           DigitValue := NoDigit;
 7 8:0  22   END    (* DigitValue *);
 7 8:0  34
 7 8:0  34 (* No initialization section necessary for this UNIT. *)
 1 1:0   0 END (* CharTools *).
```

Listing 2.

```
 1 1:D   1 PROGRAM
 1 1:D   3   CTTest;
 1 1:D   3
 1 1:D   3   USES
 1 1:D   3     (*$U CharTools.CODE *) (* File contains following
                 UNITS: *)
 7 1:D   3
 7 1:D   3   CONST
 7 1:D   3     Blank=         ' ';
 7 1:D   3
 7 1:D   3     NoDigit=      -MaxInt;
 7 1:D   3
```

```
 7 1:D    3     FUNCTION
 7 2:D    3        Capital(Ch
                              :Char)
 7 2:D    4              :Char;
 7 2:D    4     (* Return Ch, converted to upper case
                   (capital), if Ch is lower case. *)
 7 2:D    4
 7 1:D    4     FUNCTION
 7 3:D    3        LowerCase(Ch
                                 :Char)
 7 3:D    4           :Char;
 7 3:D    4     (* Return Ch, converted to lower case
                   if Ch is capital alphabetic. *)
 7 3:D    4
 7 1:D    4     FUNCTION
 7 4:D    3        ASCII(Ch
                           : Char)
 7 4:D    3           :Char;
 7 4:D    4     (* Return Ch, translated to ASCII range.
 7 4:D    4        In other words, clear the high bit of Ch,
 7 4:D    4        and return the result.
 7 4:D    4     *)
 7 4:D    4
 7 1:D    4     FUNCTION
 7 5:D    3        Alphabetic(Ch: Char)
 7 5:D    4           :Boolean;
 7 5:D    4     (* Return True iff Ch is an alphabetic character. *)
 7 5:D    4
 7 1:D    4     FUNCTION
 7 6:D    3        Digit(Ch: Char)
 7 6:D    4           :Boolean;
 7 6:D    4     (* Return True iff Ch is a numeric character. *)
 7 6:D    4
 7 1:D    4     FUNCTION
 7 7:D    3        AlphaNumeric(Ch: Char)
 7 7:D    4           :Boolean;
 7 7:D    4     (* Return True iff Ch is either alphabetic or
                   numeric. *)
 7 7:D    4
 7 1:D    4     FUNCTION
 7 8:D    3        DigitValue(Ch: Char)
 7 8:D    4           :Integer;
 7 8:D    4     (* Return Integer value represented by Ch if Ch is
 7 8:D    4        a digit; otherwise return NoDigit.
 7 8:D    4     *)
 7 8:D    4
 1 1:D    4        CharTools;
 1 1:D    3
 1 1:D    3     CONST
 1 1:D    3        VersionMark =
 1 1:D    3           'CTTEST: Test CharTools (V1 / 16-Aug-83)';
 1 1:D    3
 1 1:D    3        Repetitions =          10000;
 1 1:D    3
 1 1:D    3     VAR
 1 1:D    3        I,
 1 1:D    3        DV
 1 1:D    3           :Integer;
 1 1:D    5        Ch
 1 1:D    5           :Char;
 1 1:D    6
 1 1:D    6     PROCEDURE
 1 2:D    1        Beep;
 1 2:D    1     (* Causes the Apple's speaker to emit a beep *)
 1 2:0    0     BEGIN (* Beep *)
 1 2:1    0        Write(Output, Chr(7));
 1 2:0   10     END     (* Beep *);
 1 2:0   22
 1 1:0    0  BEGIN (* CTTest *)
 1 1:1    0     WriteLn(Output, VersionMark);
 1 1:1   64
 1 1:1   64     WriteLn(Output);
 1 1:1   72     WriteLn(Output, 'Capital(''0''):');
 1 1:1  105     Write(Output, ' Press <RETURN> to begin test');
 1 1:1  147     Ch := '0';
 1 1:1  150     ReadLn(Keyboard);
 1 1:1  158     FOR I := 1 TO Repetitions DO
 1 1:2  171        Ch := Capital(Ch);
 1 1:1  186     Beep;
 1 1:1  188     WriteLn(Output);
 1 1:1  196     WriteLn(Output, ' End of test;');
 1 1:1  230
 1 1:1  230     WriteLn(Output);
 1 1:1  238     WriteLn(Output, 'Capital(''a''):');
 1 1:1  271     Write(Output, ' Press <RETURN> to begin test');
 1 1:1  313     Ch := 'a';
 1 1:1  316     ReadLn(Keyboard);
 1 1:1  324     FOR I := 1 TO Repetitions DO
 1 1:2  337        Ch := Capital(Ch);
 1 1:1  352     Beep;
 1 1:1  354     WriteLn(Output);
 1 1:1  362     WriteLn(Output, ' End of test;');
 1 1:1  396
 1 1:1  396     WriteLn(Output);
 1 1:1  404     WriteLn(Output, 'Alphabetic(''0''):');
 1 1:1  440     Write(Output, ' Press <RETURN> to begin test');
 1 1:1  482     Ch := '0';
 1 1:1  485     ReadLn(Keyboard);
 1 1:1  493     FOR I := 1 TO Repetitions DO
 1 1:2  506        IF Alphabetic(Ch) THEN (* Nothing *);
 1 1:1  521     Beep;
 1 1:1  523     WriteLn(Output);
 1 1:1  531     WriteLn(Output, ' End of test;');
 1 1:1  565
 1 1:1  565     WriteLn(Output);
 1 1:1  573     WriteLn(Output, 'Alphabetic(''a''):');
 1 1:1  609     Write(Output, ' Press <RETURN> to begin test');
 1 1:1  651     Ch := 'a';
 1 1:1  654     ReadLn(Keyboard);
 1 1:1  662     FOR I := 1 TO Repetitions DO
 1 1:2  675        IF Alphabetic(Ch) THEN (* Nothing *);
 1 1:1  690     Beep;
 1 1:1  692     WriteLn(Output);
 1 1:1  700     WriteLn(Output, ' End of test;');
 1 1:1  734
 1 1:1  734     WriteLn(Output);
 1 1:1  742     WriteLn(Output, 'AlphaNumeric(''0''):');
 1 1:1  780     Write(Output, ' Press <RETURN> to begin test');
 1 1:1  822     Ch := '0';
 1 1:1  825     ReadLn(Keyboard);
 1 1:1  833     FOR I := 1 TO Repetitions DO
 1 1:2  846        IF Alphanumeric(Ch) THEN (* Nothing *);
 1 1:1  861     Beep;
 1 1:1  863     WriteLn(Output);
 1 1:1  871     WriteLn(Output, ' End of test;');
 1 1:1  905
 1 1:1  905     WriteLn(Output);
 1 1:1  913     WriteLn(Output, 'AlphaNumeric(''a''):');
 1 1:1  951     Write(Output, ' Press <RETURN> to begin test');
 1 1:1  993     Ch := 'a';
 1 1:1  996     ReadLn(Keyboard);
 1 1:1 1004     FOR I := 1 TO Repetitions DO
 1 1:2 1017        IF AlphaNumeric(Ch) THEN (* Nothing *);
 1 1:1 1032     Beep;
 1 1:1 1034     WriteLn(Output);
 1 1:1 1042     WriteLn(Output, ' End of test;');
 1 1:1 1076
 1 1:1 1076     WriteLn(Output);
 1 1:1 1084     WriteLn(Output, 'DigitVal(''0''):');
 1 1:1 1118     Write(Output, ' Press <RETURN> to begin test');
 1 1:1 1160     Ch := '0';
 1 1:1 1163     ReadLn(Keyboard);
 1 1:1 1171     FOR I := 1 TO Repetitions DO
 1 1:2 1184        DV := DigitVal(Ch);
 1 1:1 1199     Beep;
 1 1:1 1201     WriteLn(Output);
 1 1:1 1209     WriteLn(Output, ' DV = ', DV);
 1 1:1 1246     WriteLn(Output, ' End of test;');
 1 1:1 1280
 1 1:1 1280     WriteLn(Output);
 1 1:1 1288     WriteLn(Output, 'DigitVal(''a''):');
 1 1:1 1322     Write(Output, ' Press <RETURN> to begin test');
 1 1:1 1364     Ch := 'a';
 1 1:1 1367     ReadLn(Keyboard);
 1 1:1 1375     FOR I := 1 TO Repetitions DO
 1 1:2 1388        DV := DigitVal(Ch);
 1 1:1 1403     Beep;
 1 1:1 1405     WriteLn(Output);
 1 1:1 1413     WriteLn(Output, ' DV = ', DV);
 1 1:1 1450     WriteLn(Output, ' End of test;');
```

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```
1 1:1 1484
1 1:1 1484      WriteLn(Output);
1 1:1 1492      WriteLn(Output, 'END OF PROGRAM.');
1 1:0 1527  END      (* CTTest *).
```

Listing 3.

```
1 1:D     1  UNIT
1 1:D     1     CharTools;
1 1:D     1  (* Various tools that are useful for
1 1:D     1     manipulating Char values.
1 1:D     1
1 1:D     1     VERSION 1.1: 16 August 1983
1 1:D     1  *)
1 1:D     1
1 1:D     1
7 1:D     1  INTERFACE
7 1:D     1    CONST
7 1:D     1       Blank=             ' ';
7 1:D     1
7 1:D     1       NoDigit=           -MaxInt;
7 1:D     1
7 1:D     1    FUNCTION
7 2:D     3       Capital(Ch
7 2:D     3                       :Char)
7 2:D     4          :Char;
7 2:D     4    (* Return Ch, converted to upper case
7 2:D     4       (capital), if Ch is lower case. *)
7 2:D     4
7 1:D     4    FUNCTION
7 3:D     3       LowerCase(Ch
7 3:D     3                       :Char)
7 3:D     4          :Char;
7 3:D     4    (* Return Ch, converted to lower case
7 3:D     4       if Ch is capital alphabetic. *)
7 3:D     4
7 1:D     4    FUNCTION
7 4:D     3       ASCII(Ch
7 4:D     3                   : Char)
7 4:D     4          :Char;
7 4:D     4    (* Return Ch, translated to ASCII range.
7 4:D     4       In other words, clear the high bit of Ch,
7 4:D     4       and return the result.
7 4:D     4    *)
7 4:D     4
7 1:D     4    FUNCTION
7 5:D     3       Alphabetic(Ch: Char)
7 5:D     4          :Boolean;
7 5:D     4    (* Return True iff Ch is an alphabetic character. *)
7 5:D     4
7 1:D     4    FUNCTION
7 6:D     3       Digit(Ch: Char)
7 6:D     4          :Boolean;
7 6:D     4    (* Return True iff Ch is a numeric character. *)
7 6:D     4
7 1:D     4    FUNCTION
7 7:D     3       AlphaNumeric(Ch: Char)
7 7:D     4          :Boolean;
7 7:D     4    (* Return True iff Ch is either alphabetic or numeric. *)
7 7:D     4
7 1:D     4    FUNCTION
7 8:D     3       DigitValue(Ch: Char)
7 8:D     4          :Integer;
7 8:D     4    (* Return Integer value represented by Ch if Ch is
7 8:D     4       a digit; otherwise return NoDigit.
7 8:D     4    *)
7 8:D     4
7 1:D     4  IMPLEMENTATION
7 1:D     1
7 1:D     1    VAR
7 1:D     1       A,              (* alphabetic characters *)
7 1:D     1       AN              (* alphanumeric characters *)
7 1:D     1          :SET OF Char;
7 1:D    33
7 1:D    33    FUNCTION
7 1:D     3       Capital(* Ch
7 1:D     4                   :Char)
7 2:D     4          :Char *);
7 2:D     4    (* Return Ch, converted to upper case
7 2:D     4       (capital), if Ch is lower case. *)
7 2:0     0    BEGIN (* Capital *)
7 2:1     0       Capital := Ch; (* No change unless lower case *)
7 2:1     3       IF ((Ch >= 'a') AND (Ch <= 'z'))
7 2:1    10          THEN (* it's a lower-case letter — transform it! *)
7 2:2    12             Capital := Chr(Ord(Ch) - Ord('a') + Ord('A'));
7 2:2    19          (* Otherwise, it's not a lower-case letter, so leave
7 2:2    19             it alone. *)
7 2:0    19    END   (* Capital *)
7 2:0    32
7 1:0    32    FUNCTION
7 1:D     3       LowerCase(* Ch
7 1:D     4                       :Char)
7 3:D     4          :Char *);
7 3:D     4    (* Return Ch, converted to lower case
7 3:D     4       if Ch is capital alphabetic. *)
7 3:0     0    BEGIN (* LowerCase *)
7 3:1     0       LowerCase := Ch; (* No change unless capital *)
7 3:1     3       IF ((Ch >= 'A') AND (Ch <= 'Z'))
7 3:1    10          THEN (* it's a capital letter — transform it! *)
7 3:2    12             LowerCase := Chr(Ord(Ch) - Ord('A') +
                           Ord('a'));
7 3:2    19          (* Otherwise, it's not a capital letter, so leave it
7 3:2    19             alone. *)
7 3:0    19    END   (* LowerCase *);
7 3:0    32
7 1:0    32    FUNCTION
7 1:D     3       ASCII(* Ch
7 1:D     4                   : Char)
7 4:D     4          :Char *);
7 4:D     4    (* Return Ch, translated to ASCII range.
7 4:D     4       In other words, clear the high bit of Ch,
7 4:D     4       and return the result.
7 4:D     4    *)
7 4:D     4      CONST
7 4:D     4         HighBit=    128;
7 4:0     0    BEGIN (* ASCII *)
7 4:1     0       ASCII := Chr(Ord(Ch) MOD HighBit);
7 4:0     7    END      (* ASCII *);
7 4:0    20
7 1:0    20    FUNCTION
7 1:D     3       Alphabetic(* Ch: Char)
7 5:D     4          :Boolean *);
7 5:D     4    (* Return True iff Ch is an alphabetic character. *)
7 5:0     0    BEGIN (* Alphabetic *)
7 5:1     0       Alphabetic := (Ch IN A);
7 5:0    10    END      (* Alphabetic *);
7 5:0    22
7 1:0    22    FUNCTION
7 1:D     3       Digit(* Ch: Char)
7 6:D     4          :Boolean *);
7 6:D     4    (* Return True iff Ch is a numeric character. *)
7 6:0     0    BEGIN (* Digit *)
7 6:1     0       Digit := ((Ch >= '0') AND (Ch <= '9'));
7 6:0     9    END      (* Digit *);
7 6:0    22
7 1:0    22    FUNCTION
7 1:D     3       AlphaNumeric(* Ch: Char)
7 7:D     4          :Boolean *);
7 7:D     4    (* Return True iff Ch is either alphabetic or numeric.
                  *)
7 7:0     0    BEGIN (* AlphaNumeric *)
7 7:1     0       AlphaNumeric := (Ch IN AN);
7 7:0    10    END      (* AlphaNumeric *);
7 7:0    22
7 1:0    22    FUNCTION
7 1:D     3       DigitValue(* Ch: Char)
7 8:D     4          :Integer *);
7 8:D     4    (* Return Integer value represented by Ch if Ch is
7 8:D     4       a digit; otherwise return NoDigit.
7 8:D     4    *)
7 8:0     0    BEGIN (* DigitValue *)
7 8:1     0       IF ((Ch >= '0') AND (Ch <= '9'))
7 8:1     7          THEN
7 8:2     9             DigitValue := (Ord(Ch) - Ord('0'))
7 8:1    12          ELSE
7 8:2    16             DigitValue := NoDigit;
7 8:0    22    END   (* DigitValue *);
7 8:0    34
7 1:0     0  BEGIN (* CharTools UNIT initialization *)
7 1:1     0     A := ['A'..'Z', 'a'..'z'];
7 1:1    27     AN := A + ['0'..'9'];
1 1:0    52  END     (* CharTools *).
```

IMPORTANT SUBSCRIBER NOTE

We wish it clearly noted that the "TROMPERS" advertisement to the left has expanded past the boundaries of its ad space. Further, the Trompers themselves are taking over this entire page! Is that fair? Well, is it? There could be a perfectly fine advertisement here for modems or RAM boards or dust covers--something sensible. But, NO! Instead, there i proliferation of intergalactic chamacallits bouncing all over place--here and in stores all across United States. They're taking over!

Okay, okay, so what if it's a great game? Who cares if it's lots of fun? That's hardly the p is it? We dont' care if young p and adults wi joy it. No! W don't, don't, do

The s that this is not their ad space. I know you don't re care about it now, but just until they take over thing. Think about th o more government. No mo fire people. No human movie stars.

We'll be buying ham from McTrompers, shirts with littl Trompers sewn on them, ice cream fr Daily Trompers, w ve by staying at Ho pers when we're on

Where's it all g g to end uh? Where?

THE AVANT-GARDE GAMES HIT LIST

This Week	
1	**JUMP JET** (Apple)
1	**HI-RES COMPUTER GOLF 2** (Apple)
1	**LAZER MAZE** (Apple, Atari, IBM PC, Commodore, VIC 20, TI 99)
1	**TROMPERS** (Apple)
1	**TRIPLE ARCADE INSANITY** (Apple)
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Buttonwood Apples

BY KEN LANDIS

"John, this is Ken. Go long a round lot of GBX common for me at the market."

What did I just do? I told my stockbroker to purchase one hundred shares (a round lot) of GBX common stock for me at the going market price. Why common stock? Because it's the most popular fluid form of individual investment in the world.

A share of common stock may cost less than five cents or more than fifty dollars. Common stocks are like people—each has its own personality, good points, and bad points. When it comes to dealing with common stocks, the trick is to decide which ones we want to hang around with.

Stock Talk. Stocks don't jump out at you and say, "Hello. Buy me and we'll make lots of money together." The way to identify stocks worth investing in is by reading about them, about the market, and about general business conditions. Once you've done some research, you'll be in a position to find stocks that look good to you, analyze them, and, if you still like them, buy them.

One way to get started is to establish a relationship with a full-service broker. Full-service brokers like Merrill Lynch, Prudential-Bache, Shearson/American Express, and others have large comprehensive research departments that do nothing but analyze stock after stock, industry after industry. When they find something they like, they issue a recommendation. Stockbrokers at any full-service house will be pleased to send you copies of their research reports. These reports offer a good means of getting a handle on the market, and they're free.

Of course, you don't have to follow the research report recommendations. (If the people who wrote them were always right, they'd be slurping up Pina Coladas in some tropical paradise.) But research reports will give you a rough idea as to which industries in the market are hot and which are cold. For example, when oil was in short supply, oil stocks were booming. Then when the oil glut started, oil stock prices plummeted.

This action-reaction brings us to an important point: What makes stocks go up and down? Good question—if we could know that with 100 percent certainty, we'd all be inhaling Pina Coladas by now.

Economic events, such as interest rate changes and inflation, have an impact on stock prices. If the news is bad—if, say, interest rates are going up to 50 percent, stock prices will probably fall. If the news is good, stock prices will probably rise.

Financial news and reports also affect stock prices. If Rinky Dink Products has had an exceptional year, the price of its stock will probably rise; if the company has had a bad year, prices will probably fall.

Why "probably" rise or fall? Because emotion also plays a big part in the stock market. Remember, the stock market is an auction market in which prices are determined by bidding. Someone who wants a stock badly enough is very likely to be wiling to pay more for it than it's really worth. In fact, people have been known to buy stocks for the same reason that they bet on a particular horse: the name. Human beings are funny animals. When they want to do something badly enough, all the logic and reasoning in the world doesn't matter; they still do exactly what they want.

Let's assume that we're in one of our more rational moods, and that today isn't the day we want to bet half our life savings on a company just because we liked the television commercials it ran during the Sunday night movie. How can we decide whether or not we want to buy this company's stock and whether it's worth the asking price?

How we arrive at our answer will depend on our orientation. In this article, we'll discuss the rudiments of how to analyze a stock fundamentally; next time, we'll analyze a stock from a technical perspective. The exact outcome of either analysis depends on what we focus on. Fundamental analysis and technical analysis don't always agree or disagree; rather, they reveal different things. It's up to you to decide which to bet your money on.

Weighing Widgets. Assume that we've just finished reading a research report from the prestigious brokerage firm of Risk, Rate, and Reward. The report has piqued our interest in the widget business, and we are considering making an investment. The widget business seems to have good prospects for growth, and our hope is that stock in a company that manufactures widgets will increase in value as the demand for widgets grows.

The first part of our analysis centers on who is in the widget business. We know the names of some of the big competitors, such as American

Apple Computer 3141

NASDAQ Symbol AAPL (Incl. in Nat'l Market; marginable)

Price	Range	P-E Ratio	Dividend	Yield	S&P Ranking
Mar. 12'83	1983				
41 3/8	48 5/8-27 1/4	34	None	None	NR

Summary

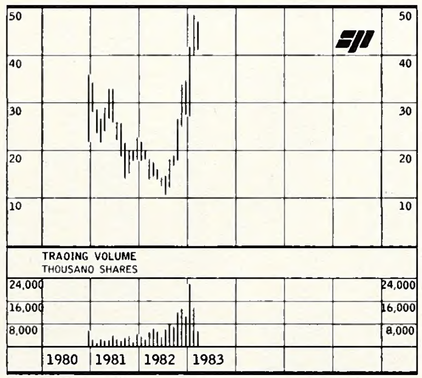
This company is a leading manufacturer of microprocessor-based personal computer systems. The Apple II and Apple III are its major systems. New products are expected to be delivered in 1983. While the substantial earnings gains of recent years are likely to moderate as sales and earnings bases expand, commitments to new product and market development enhance longer-term prospects.

Current Outlook

Earnings for fiscal 1983 are estimated at $1.45 a share, up from fiscal 1982's $1.06.

Initiation of cash dividends is not currently anticipated.

Sales should continue their strong upward trend in fiscal 1983, although the extraordinary gains of the past few years are not expected to be repeated. Sales should benefit from new product introductions and increasing shipments of Apple III computers. Margins should continue to come under pressure from start-up expenses of new products (including Lisa—see Important Developments), increasing commitments to research and development and higher marketing expenses. Over the longer term, Apple's strong position in the rapidly expanding personal computer market should prove beneficial.



Revenues (Million $)

13 Weeks:	1982-3	1981-2	1980-1	1979-80
Dec.	[2]214.3	133.6	67.6	19.5
Mar.		131.0	78.8	23.5
Jun.		142.7	90.7	32.6
Sep.		175.8	97.7	41.5
		583.1	334.8	117.1

Sales for the three months ended December 31, 1982 advanced 60%, year to year, reflecting continued strong demand for the Apple II and increased volume for the Apple III and peripheral products and software. Margins widened despite a 70% increase in marketing and distribution expenses and an 81% rise in R&D costs. Income from operations was up 77%. Following higher net interest income, pretax earnings advanced 79%. After taxes at 49.0%, against 47.5%, net income was up 73%. Share earnings were $0.40 versus $0.24.

Common Share Earnings ($)

13 Weeks:	1982-3	1981-2	1980-1	1979-80
Dec.	[2]0.40	0.24	0.14	0.06
Mar.		0.24	0.16	0.06
Jun.		0.26	0.21	0.06
Sep.		0.32	0.19	0.07
		1.06	0.70	0.24

Important Developments

Jan. '83—The company introduced Lisa, a 16-bit personal computer. Priced at $9,995 and scheduled for volume shipments beginning in June, Lisa is based on a new software technology that integrates common office functions, such as spreadsheet analysis, word processing, business graphics, graphics design, personal filing and project management, in an easy-to-use format. Another new product, which is being shipped, is the Apple IIe, a successor to the Apple II.

Next earnings report due in mid-April.

Per Share Data ($)

Yr. End Sep. 30	1982	1981	1980	1979	1978
Book Value	4.50	3.14	0.42	0.22	NA
Earnings	1.06	0.70	0.24	0.12	0.03
Dividends	Nil	Nil	Nil	Nil	Nil
Payout Ratio	Nil	Nil	Nil	Nil	Nil
Prices[1]—High	34 7/8	34 1/2	36	NA	NA
Low	10 3/4	14 1/4	22	NA	NA
P/E Ratio—	33-10	49-20	NM	NA	NA

Data prior to 1981 as reptd. in prospectus dated 12-12-80. 1. Cal. yr. 2. 14 wks. NA-Not Available. NM-Not Meaningful.

Standard OTC Stock Reports Vol. 49/No. 34/Sec. 6 | March 23, 1983 | Standard & Poor's Corp. 25 Broadway, NY, NY 10004

3141 Apple Computer, Inc.

Income Data (Million $)

Year Ended Sep. 30	Oper. Revs.	Oper. Inc.	% Oper. Inc. of Revs.	Cap. Exp.	Depr.	Int. Exp.	Net Bef. Taxes	Eff. Tax Rate	Net Inc.	% Net Inc. of Revs.
1982	583	119	20.4%	[1]26.5	16.6	0.44	117	47.5%	61.3	10.5%
1981	335	75	22.3%	[1]24.5	8.6	1.30	77	48.5%	39.4	11.8%
1980	117	25	21.3%	4.9	1.4	0.21	24	51.6%	11.7	10.0%
1979	48	10	21.5%	1.0	0.2	0.07	10	49.8%	5.1	10.6%
1978	8	2	19.8%	0.3	Nil	NM	2	48.7%	0.8	10.1%

Balance Sheet Data (Million $)

Sep. 30	Cash	Current Assets	Current Liab.	Ratio	Total Assets	Ret. on Assets	Long Term Debt	Common Equity	Total Cap.	% LT Debt of Cap.	Ret. on Equity
1982	153	317	85.8	3.7	358	19.7%	2.05	257	272	0.8%	27.8%
1981	73	227	70.3	3.2	255	23.9%	1.91	177	185	1.0%	38.1%
1980	2	54	11.1	1.4	65	27.0%	0.67	26	28	2.4%	65.7%
1979	1	20	37.8	1.8	21	39.8%	0.20	10	10	2.0%	85.1%

Data prior to 1981 as reptd. in prospectus dated 12-12-80. 1. Net of curr. yr. retirement and disposals. NM-Not Meaningful.

Business Summary

Apple Computer designs, develops, produces, markets and services microprocessor-based personal computer systems for individual use in a variety of computing applications. Systems typically include a computer mainframe and peripherals, operating software to control the system and applications software to solve problems. Supplemental circuit boards and optional accessories can be added to perform additional/different tasks. Development of a variety of applications software and peripheral equipment for use with the Apple II in 1978 and 1979 stimulated use of Apple systems by persons without—as well as by those with—prior computer experience.

The company's principal product has been the Apple II, introduced in 1977. The Apple IIe, introduced in January, 1983, is the successor to the Apple II. Packaged in a 12-pound case are the basic units of a computer, including a microprocessor, random access memory, read only control memory, a typewriter-style keyboard and a power supply. The Apple IIe can provide output to a black-and-white or color video monitor and can display 40 or (with optional card) 80 characters per line or graphics in up to 16 colors. The Apple IIe has 64K bytes of memory, expandable to 128K bytes. The Apple IIe is priced at $1,395 for the main processor and $1,995 for a package including peripherals.

In November, 1981, the company reintroduced its Apple III model and deliveries began in December. This is a new version of the model first introduced in May, 1980.

Lisa, which was introduced in January, 1983, is a 16-bit personal computer. Priced at $9,995, Lisa includes a 12-inch black-and-white screen with high-resolution imaging, one megabyte of main memory storage plus two built-in floppy disks at 860 K bytes each and a five megabyte ProFile hard disk. Lisa is based on a new software technology that integrates common office functions in an easy-to-use format. Included in the Lisa system are six software applications for the office.

AppleNet, a local area network that would allow linkage of several Apple computers, is expected to be available in late 1983.

The company's manufacturing operations consist mainly of the purchase, assembly and test of the materials and components making up its products at facilities in California, Texas, Ireland and Singapore.

Employees: 3,391.

Dividend Data

No cash dividends have been paid, and the company intends to retain its earnings, for the foreseeable future, for use in the development of the business.

Finances

Plans to establish a wholly owned subsidiary in Japan, to market personal computers there, were announced in May, 1982.

In the company's initial public stock offering on December 12, 1980, underwriters led by Morgan Stanley & Co. and Hambrecht & Quist sold some 4,600,000 shares (4,000,000 shares new financing) of Apple Computer, Inc., at $22 per share.

Capitalization

Long Term Debt: $2,052,000 of lease obligations (9/30/82).

Common Stock: 57,528,550 shs. (no par). Officers and directors control about 30%. Institutions hold some 21%.

Office—20525 Mariani Ave., Cupertino, Calif. 95014. **Tel**—(408) 996-1010. **Chrmn**—S. P. Jobs. **Pres & CEO**—A. C. Markkula Jr. **Exec VP-Fin**—K. R. Zarba. **VP & Secy**—A. A. Eisenstat. **Investor Contact**—Stan DaVaughn. **Dirs**—P. O. Crisp, S. P. Jobs, A. C. Markkula Jr., A. Rock, P. S. Schlein, H. E. Singleton. **Transfer Agent & Registrar**—First National Bank of Boston. **Incorporated** in California in 1977.

 Sheila Peck

A Reproduction of the March 23, 1983, Standard and Poor's Report on Apple Computer

Widget, Amalgamated Widget, and Acme Widget. But there may be other companies whose names we don't know that could be good investments. One way to find out who the other major competitors are is to ask the companies you already know about.

All publicly held corporations must file a report called a 10K with the Securities and Exchange Commission (SEC). A 10K is a company's annual report with some additional information that's required by the SEC. In a 10K, a company's managers tell who they feel their competition is. Some libraries have 10Ks on microfilm. If your local library doesn't, call or write the companies you're interested in and ask for copies of their 10Ks; they'll be glad to send this information to you.

Another way to find out who's who in a specific industry is to use a publication known as a corporate register. Businesses are classified and listed by SIC, or Standard Industrial Code. To learn to use a corporate register and SIC codes, ask your local librarian.

Once you've gathered a list of companies, you're ready to begin research and analysis. Go to the library (or stay there if you're there already) and find the Standard and Poor's stock reports.

Standard and Poor's compiles statistics on virtually every publicly owned company in the United States. Each report contains a brief description of the company's recent history, including important financial information and news items. It's possible to get a great deal of financial information from annual reports, but the information from stock reports is more concise and easier to digest.

There are three different sets of Standard and Poor's Stock Reports: one for the New York Stock Exchange, one for the American, and one for the over-the-counter and regional exchanges. To find a stock, you'll need to know where it's listed or traded.

The figure on the opposite page is a reproduction of the Standard and Poor's stock report for Apple Computer, which trades over the counter. Let's take some time to go over the report to see what we can learn from it.

Each stock traded in the United States has a unique stock symbol. Sometimes a symbol looks or sounds like the company name, sometimes it does not. The NASDAQ (National Association of Securities Dealers Automated Quotations System) symbol for Apple Computer is AAPL. To get the price of Apple stock from a quote database, we'd use that symbol.

The price for one share of Apple Computer stock on March 12, 1983, was 41⅜. The stock's high between January 3 and March 23, 1983 (the date this report was issued), was 48⅝ and its low during this period was 27¼. Does this range tell us anything significant? Had the stock market been stable, it would mean that we could assume that Apple's common stock fluctuates a great deal. But the other reading we've done tells us that we have a bull market, a market that's going up. It appears that Apple went up with the rest of the market. Had Apple stock gone down, it would have indicated either that the company was contracyclical (reacting opposite to the rest of the market) or that something was wrong.

Apple's *P-E ratio* (price-earnings ratio) was 34 on March 23. Price-earnings ratios are computed by dividing the stock price by the company's earnings per share. The higher the P-E, the more speculative the stock. Earnings are used to pay dividends and to fund growth. The lower a company's earnings, the lower its dividends, which probably means there's been little growth. That's true unless the market is a new one, such as genetic engineering, where current growth is financed by other sources, such as venture capital.

Stylish Investing. We can see that Apple is not paying a dividend. Some stocks pay dividends, while others don't. This doesn't make one stock better than the other. The stock you choose should reflect your personal investment style. If you're looking for cash flow from a security, you'll look for a stock that pays dividends. If you're looking for a stock with a high probability of capital gains—that is, a stock that is likely to increase in value much faster than the rest of the market—you'll want a stock that pays low dividends or none at all. When a company's board of directors decides to pay low dividends or none, that generally means one of two things—the company is using all of its earnings to grow (a good sign) or there's no money (a bad sign). Make sure you know the situation before you buy.

A stock that has no dividend has no yield. *Yield* can be equated to interest earned on savings deposits. A common formula that can be used to find a stock's yield is the yearly dividend divided by the stock's price. For example, if Rinky Dink Industries pays a yearly dividend of $1 and

its stock price is $10, its yield is 10 percent. The question you're faced with is, "Am I better off putting my money in a nonrisk savings account and earning 7 or 8 percent (by today's rates) or is an 11 percent rate from a security that can go up and down worth the risk?"

Just by reading the very top line of the stock report, we've learned about Apple's volatility, its dividend policy, and its P-E ratio. In other words, its history. This information is usually enough to give us a feeling for a stock and the way it behaves. But it's not enough to base an investment decision on. We need to learn more about the company, its products, and its prospects—after all, we can't make money on past performance, only on future performance.

The stock report summary tells us what business a company is in and what significant events may be about to happen in connection with it. Remember a little earlier when we mentioned emotion as a factor that affects stock prices? Let's consider an example. Say you read somewhere that Apple Computer has developed a $5,000 personal computer system that offers the same power as a $6 million supercomputer. What effect do you think this development would have on the price of Apple stock? It might just go up to $5,000 a share. The trick is to be one of the first to find out about a new development, or an impending disaster. If you can manage that, then you can ride the wave up or down, making money along the way. (To make money in a bear market, or in a market that's falling, you'd sell short; we'll discuss this technique in a subsequent column.)

Research and reading can help you be "in early" on a stock, but don't be too early. If your Uncle Fred heard from his bowling buddy that his employer, Rinky Dink, is going to announce a new, important product and that he should buy stock in the company, do not let him. And don't you buy it either. This type of information is called "insider information" and it's illegal to buy or sell securities based on this knowledge.

The *current outlook* section tells us what can be expected in the near future. The *revenue* section shows us a thirteen-week comparison of revenue (sales) over the last few years. As you can see, Apple is growing, and that's a good sign. As a matter of fact, the company has grown at an astronomical rate over the last few years. Looking at the figure under "Per Share Data($)" we see that during 1980 and 1981 Apple's highs were very close but the lows were not. Danger sign. If a company is growing rapidly and its stock price is not rising rapidly, that means the stock price already reflects the investment community's expectations about the company.

Common share earnings show what amount of earnings per share is supporting a stock's price. There are many ways of using this number, but the most common is to estimate dividends, if there were any. The *payout ratio* in the Per Share Data section shows what percentage of earnings per share is being paid out in dividends; Apple's says nil because Apple isn't paying any dividends.

Historical Dink. Assuming that Rinky Dink earned $2 per share and paid out $1, the company's payout ratio is 50 percent. To guesstimate what a corporation will pay in dividends, we can look at its historical payout ratio, find an average, and multiply that times current or estimated earnings.

The *income data* section shows us important information distilled from Apple's income statement. Standard and Poor's reprints the numbers that most investors are concerned with. From this chart we can find out the sales (operating revenues), operating income, capital expenditures, depreciation, interest expense, net income before taxes, and net income. These figures tell us a great deal about the stock and about the company.

Sales figures show us whether a company is growing, stagnant, or shrinking. Obviously, unless we have some strange form of investment strategy (or we sell short), we are going to look for a company with growth potential. Growth signifies health.

Operating income is the earnings of the corporation before such business expenses as salaries, general costs, administrative expenses, and interest charges have been deducted. Most investors do not find the figures for operating income, depreciation, or interest expense very significant. That's not to say that these figures aren't important; they are. It's just that most people don't know how to use them. Making effective use of this information requires understanding fully how an accountant constructs an income statement. Explaining how this is done would require the rest of this month's issue and probably most of next month's. A better strategy for learning about income statements and about what these numbers mean is to read a book on accounting for nonaccountants. The time and effort you spend learning will be well worth it in the long run.

Capital expenditures are what a corporation spends on its future. Buildings and equipment are examples of capital expenditures. The generally accepted theory is that the more a corporation spends, the better. The *effective tax rate* tells us how much of every dollar Apple earns goes to Uncle Sam. This figure is the opposite of capital expenditures; the lower it is, the better. *Net income* tells us how much profit Apple made, and *percent net income of revenues* shows us how much profit the company made and kept for each dollar of sales.

"Great," you're probably saying to yourself. "Now I know how to read this stuff and what it means, but how do I use it? And what's Apple's competition doing?" The only way to get answers to these questions is to get the stock reports for Apple's competition and compare them to Apple's stock report.

Balance sheet data gives us a snapshot of a company's financial posture at a given point in time. A balance sheet can be difficult to interpret. If you're unfamiliar with accounting terminology, it's a very good idea to buy a book on accounting for nonaccountants.

Basically speaking, what you should be looking for in a balance sheet is a company that has a high return on assets, a small percentage of debt as a component of total capitalization (% LT Debt of Cap.), and a high current ratio. The higher the return on assets, the more a company is making for its size. The lower a company's debt, the less the company owes; the higher the current ratio, the more money the company has available to pay current bills (the more liquid it is).

These are good rules of thumb, but they shouldn't be followed unquestioningly. Many companies that are good investments wouldn't look like good investments if you only analyzed them this way. The only real answer here is to force yourself to learn how to read and interpret the numbers.

The remainder of the stock report provides a short history, called the business summary, along with dividend data, financing plans, and capitalization—how much money is owed (debt) and how many shares of stock there are and who owns them. It would not be an exaggeration to say that stock reports function as an investor's map, compass, and sextant.

A great deal of the material we've just covered may be new to you, or it may be old hat. To succeed at picking stocks and making investment decisions, you'll need to be proficient at accounting, research, and financial analysis. Common sense won't hurt either.

Stocked Daily. Stock prices and companies change daily. Any stock report or profile you get from the library is dated. To stay on top of things, you must supplement these sheets with current information. This month's software review looks at the *Personal Investor*, a package designed to get current information for you from the Dow Jones News/Retrieval Service and to produce reports on your portfolio.

The Personal Investor, by Richard Parker, PBL Corporation (Box 559, Wayzata, MN 55391; 612-473-8998). $145 (with Dow Jones contract; includes one hour free usage).
Backup policy: copyable.
System requirements: Apple II, II Plus, or IIe; one or two disk drives. Optional: D.C. Hayes Micromodem or Apple comm card; eighty-column printer.

The *Personal Investor* would seem to embody the best of both worlds—it's an integrated stock retrieval and portfolio accounting package at a great price. This program doesn't have the same features and functions in its portfolio accounting module as *Portfolio Master* or the *Stock Portfolio System*, but for beginners, or for experienced investors who want basic functionality at a reasonable price, the *Personal Investor* can't be beat.

The publisher describes this program as a combination of an automated index card, storage box, calculator, pencil, eraser, and personal assistant. The end result is a software package that will automatically log on to the Dow Jones News/Retrieval Service, fetch quotes, post the new prices to the securities in your portfolio, and prepare a series of reports to help you manage your holdings.

The other major feature of the *Personal Investor* is a Dow Jones News/Retrieval terminal mode, which makes it convenient to use the nonquote services on the Dow Jones system, such as corporate news, earnings estimators, sports, and weather.

In a single-drive system, the *Personal Investor* stores your portfolio

information on the program disk so that you don't have to swap disks; it can store a maximum of 80 stocks, 150 purchases, and 100 sales. If you have a two-drive system, you can store 300 stocks, 600 purchases, and 500 sales per data disk.

The centerpiece of the entire program is the add/change stocks screen. This screen is well designed, functional, and easy to use. It is through this screen that you inform the *Personal Investor* of your stock purchases, sales, splits on your stock, and dividends.

All stocks you place in the portfolio are added via this screen. Each stock has its own record. The program can handle multiple purchases of the same stock; purchases are added as separate line items in the bottom half of the add/change screen. Dividend yields are calculated on both the current stock price and on the purchase price so that you can quickly see any variations. In addition, the date a stock trades without its dividend (the ex-dividend date) is recorded to help you time purchases or sales with dividend percent declarations.

The add/change screen is also the window through which to view your stock records. You can page backward or forward through your portfolio to check the information stored on each security. Stocks are stored in the order you originally entered them.

It's also possible to get quotes on stocks you don't own but are interested in following. This is done by adding the stock through the add/change screen without recording a purchase. Once you've done this, the *Personal Investor* will update the price every time you log on to Dow Jones but the program won't include the stock in your portfolio. To look at the stock quote of any of these securities, or quotes on any of your own stocks, use the quote screen.

The quote screen displays the latest quotes fetched and stored by the *Personal Investor*. When you update, the program fetches the last price, the close of the day before, the current high and low prices, and the volume traded from Dow Jones. Then when you request a quote, the program retrieves this information from disk and displays it on your Apple monitor. The *Personal Investor* can also calculate and display a stock's net change in price and its current yield on this screen.

The quotes screen is accessible from any of the three portfolio menus.

To review a quote, enter the stock's symbol, which is displayed in the top portion of the screen, or page through the portfolio by pressing the return key. Information from the quote screen can be printed out.

DJ Reports. The *Personal Investor* can also generate four reports from the information you enter via the add/change screen and the quotes you've retrieved from Dow Jones. These reports can be displayed on the Apple's monitor or printed out. (The printed reports and the on-screen reports are slightly different—the printed ones contain more information.)

The program also provides a tax report, which is a record of your sales of stock. This tax report shows you whether the proceeds from the sale of a certain stock will be subject to short- or long-term taxation. The program computes the total short- and long-term profits, along with the overall total profit or loss on sales.

The description and price review report lists all the stocks in your portfolio, with date of purchase, number of shares owned, price paid, and last price quoted. The commission, which is shown in the printed report, is calculated by the system; it is the difference between the number of shares purchased, multiplied by the purchase price, subtracted from the gross cost you entered through the add/change screen.

The gain/loss report resembles the tax report. Whereas the tax report tells you the profit or loss on actual sales, the gain/loss report tells you the value of your portfolio based on the last updated prices. This report shows the value of your portfolio at particular points in time. The *Personal Investor* deducts any taxes or commissions you paid when you purchased various securities, but it does not deduct the transaction charges you'll incur if you sell. The true value of your portfolio is the total gain or loss minus transaction fees. You can get an estimate of what these fees would be from your broker.

The printed dividend report gives you the ex-dividend rate, the projected quarterly dividend, the projected annual dividend, the yield of the stock based on the purchase price, and the yield of the stock based on the current price. (The on-screen version of the report omits the ex-dividend and quarterly dividend columns.) This report is very helpful; you can use it to synchronize your sales and purchases so that you succeed in taking advantage of dividends.

Every one of the reports the *Personal Investor* produces is easy to read, well laid out, and very useful.

The news terminal feature of the program resembles those of other news terminal packages and modules we've looked at, in that the system (when equipped with a D.C. Hayes Micromodem II) dials and logs on to Dow Jones automatically. But that's where the similarity ends. Dow Jones formats its information in eighty columns. The *Personal Investor* provides a series of commands that can be used to put the Apple in either forty- or eighty-column mode. If you stay in forty-column mode, the Dow Jones information wraps around the screen. If you place it in the *Personal Investor*'s eighty-column mode, information stays in eighty-column format. The program also allows you to flip back and forth between modes.

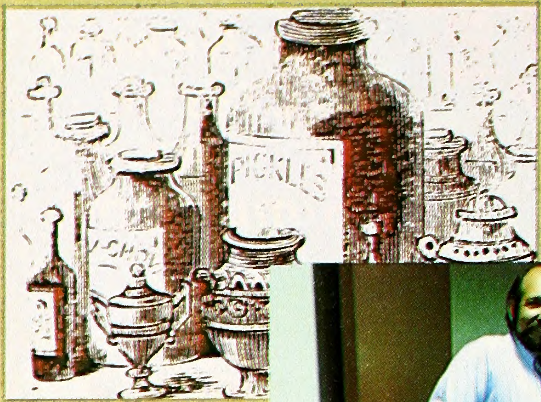
The news terminal lacks a built-in buffer to store incoming information, so if you want to save information you must print it out. Unfortunately, having a printer on-line slows down the storage process. And the longer you have to stay on Dow Jones, the higher your bill will be. A preferable arrangement would have been to have a memory buffer, since memory can store information much faster than a printer can.

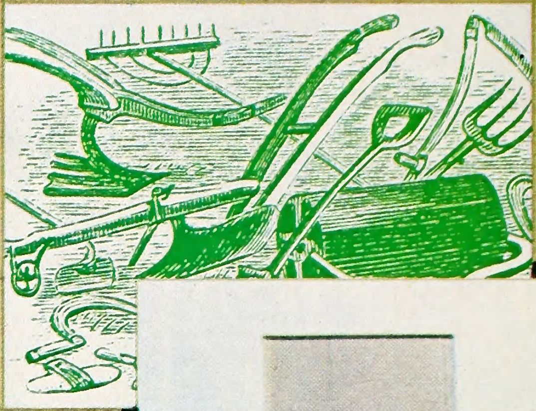
The *Personal Investor*'s "cursor calculator" allows you to multiply, divide, subtract, and add positive or negative percentages to any number you're entering into the program. So instead of doing your math on a calculator and then entering the results into your system, you can do everything from right within the program, saving you time and trouble.

The program's editing routines are quite well done. Correcting a mistake is almost effortless. If you should exceed the program's storage limitation, you can summarize your transactions automatically in order to make additional storage space available. After you run the tax report, the program asks you if you want to summarize all of your transactions, clear your portfolio (at the end of a tax year), or leave the entries alone. If you elect to summarize the transactions, the program will carry forward your portfolio balances and delete the detail.

The program documentation is excellent—it's clear, easy to read, and logically arranged. The error-trapping is outstanding; it seems to be impossible to get the system to bomb or lose data.

The *Personal Investor* is a pleasure to learn and use.





THE WALL STREET JOURNAL.

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WESTERN EDITION — TUESDAY, SEPTEMBER 6, 1983 — RIVERSIDE, CALIF. — 40 CENTS

What's News—

Business and Finance

THE UAW ACCEPTED a new offer of increased wages from Chrysler that would extend their current labor contract past its mid-January... Details of the tentative

World-Wide

REAGAN SHUNNED tough retaliation for Russia's downing of a Korean jetliner. In a TV address, the president condemned Moscow for the "Korean Airline Massacre," and used the incident to urge support for his defense buildup. He played an excerpt of a recording of a Soviet pilot involved in last week's downing of a South Korean airliner carrying 269 people. He said ... landing rights

Unemployment Rate

UNEMPLOYMENT in August was unchanged at a seasonally adjusted rate of 9.5% of the labor force, the Labor Department reports. (See story on page 3.)

Labor Letter

A Special News Report on People And Their Jobs in Offices, Fields and Factories

TEACHERS' HELPERS: Business takes up the slack caused by school budget cuts.

The Committee for Economic Development, a business group, launches a "Business and the Schools" project. It raises half of its $400,000 target and will examine such subjects as what business can do to aid public educators in Florida. The American Federation of Teachers and several hundred companies start an "Education Means Business" drive; it includes joint lobbying for state funds and "adoption" of schools by corporations.

Pennsylvania businesses fund a "mini-grant" plan that awards teachers up to $500 for special projects. Ten New York ... "mentor" program to ...

All in the Family

How Third Generation Came to Take Control At Puritan Fashions

Deathly Ill, Carl Rosen Spent Last Months Paving Way For His Son's Succession

'Always Afraid of My Father'

By DENNIS KNEALE
Staff Reporter of THE WALL STREET JOURNAL

NEW YORK—Puritan Skirt & Dress Co. was a small business when 27-year-old Carl Rosen succeeded his father, Arthur, as president in 1947. But over the next 36 years, the son and heir built the company, which came to be called Puritan Fashions Corp., from a ... into a publicly traded ...

Indonesia Pushes Plans For Moving Millions Off the Island of Java

... Other Islands

FROM SLOW TICKERS TO FAST NEWS

A Visit with DOW JONES

BY JOANN LEVY

Route 1, which arrows along the edge of Princeton, New Jersey, is lined with corporate facilities set like plantation manors amid duck ponds and sculpted lawns. A long, curving driveway leads to one such structure, half-hidden behind darkened glass. On the second floor, a spacious office suite provides a sofa for a relaxed and expansive executive.

"That was pretty cheeky," admits Bill Dunn, president and publisher of the Dow Jones Information Services portion of Dow Jones, as he recalls the mission statement with a grin.

A major reorganization of Dow Jones & Company in 1980 resulted in seven operating groups. "Every group has to have a mission statement," says Dunn. "Ours basically was that we intend to be the largest electronic publisher and distributor of business and financial information. Three years ago no one else was saying anything, so we thought why not just say we're the largest and try to be the best until somebody else can demonstrate that we have no reason to be in this marketplace."

Three years ago the Dow Jones News/Retrieval Service boasted ten thousand subscribers. By the end of this year, subscriptions to its twenty-two databases—which now encompass an encyclopedia, sports, world news, weather, movie reviews, and a shop-at-home service as well as business and financial information—are expected to top one hundred ten thousand.

Dunn wouldn't be surprised by a sometime-in-the-future subscription base of ten million. "It sounds silly now," he concedes, "as silly as if in 1936 somebody had said the *Journal* would someday have two million subscribers.

"In 1936 no one was buying stocks and my dad was carrying a signboard in Des Moines, Iowa, selling frankfurters. So who's going to be reading the *Wall Street Journal* then?"

The analogy is probably not lost on far-sighted futurists, but the whole concept of electronic publishing would undoubtedly be wondrous indeed to three reporters named Charles Dow, Edward Jones, and Charles Bergstresser.

It was in 1882 that they formed Dow Jones & Company, the company part consisting of the multisyllabic Bergstresser whose name apparently lacked letterhead fitness. Theirs was a fairly straightforward operation, with Jones editing stories submitted by Dow and Bergstresser and scribes handwriting one-page bulletins delivered to Wall Street subscribers by messengers.

Refinements came rapidly. By 1883, the bulletins, called "flimsies," were summarized in a two-page publication called the "Customers' Afternoon Letter," which in 1889 became a four-page newspaper called the *Wall Street Journal*.

Delivery by horse and buggy, while dependable, was slow. For increased speed, the company initiated the Dow Jones News Service, operating over telegraph wires and employing the latest technology: a

printing device driven by ninety-six-pound clock weights requiring winding every half hour. It was called a "ticker."

The broadtape, so named to distinguish it from the narrow tape that carried stock quotations, carried business and financial news. With the advent of electricity, the clock weights became museum pieces and technological improvements continued. New, high-speed tickers inaugurated in New York in 1931 were capable of receiving sixty-five words a minute.

By 1964, Dow Jones had news-ticker clients in 676 U.S. cities and the service kept getting faster, despite the growing amount of information. In 1968, General Electric machines, developed for computer printouts and capable of speeds of three hundred words a minute, were modified for the Dow Jones broadtape. By 1970, the printers probably could have been driven faster than they could be read, with offices conceivably inundated by ticker tape.

"We started to get this perception of too much information," says Dunn, "yet we didn't want to restrict the flow. We just had to find a different way to present it."

For $25,000 a New Jersey research group, apparently subscribing to the dictum "If it ain't broke, don't fix it," advised against changing the system. But there was enough "gut reaction," according to Dunn, that the company decided to go ahead anyway.

Enter Bunker Ramo, which had just completed a major quotes project for the National Association of Securities Dealers. In a 50-50 joint venture, Bunker Ramo supplied technical and marketing skills, and in 1971 Dow Jones pioneered electronic publishing with a news product developed from its ticker. Business and financial information, linked, categorized, and cross-indexed for Bunker Ramo's computer, was now subscriber-accessed from hard-wired terminals that Bunker Ramo and two other quotes vendors, Quotron and General Telephone and Electronics, provided the brokerage community.

Essentially, Dow Jones was a wholesaler to the three quotes vendors during the early seventies. "But the market was going south then," recalls Dunn and, with brokerages going out of business or consolidating, Dow Jones was losing a ticker here and a quote-vending terminal there. So why not broaden the market and provide the service for corporate treasurers, controllers, and librarians?

Bunker Ramo was hurting and didn't want further investments. "We knew then we were going to get divorced," says Dunn, "so we started figuring out what the value of the house was, the car, and we ended up negotiating a buy-out for all of the retrieval service."

Now Dow Jones, as a retailer like Bunker Ramo, GTE, and Quotron, could have sold its service to the brokerage community directly. "But," says Dunn, the others having invested in marketing and terminals, "it would have been unfair of us to go in and say, well, here's Dow Jones and you can throw those bums out." Besides, that was a relatively small market and they were still wholesaling to the quotes vendors anyway.

What they wanted was to sell their service to corporations, which could access it through time-sharing terminals.

And then, says Dunn, "we got lucky." Along came Eve and Dow Jones was introduced to Apple. "We'd never heard of them," recalls Dunn. "They were making about seven hundred thousand dollars a year then, instead of over a billion. They were trying to sell hardware; we were a database purveyor, a reason why people would buy their hardware. We didn't have to sell hardware for our information to be valuable."

A communications package and cooperative marketing arrangements with Apple in 1977 set the stage for similar agreements with Commodore, Radio Shack, Atari, Texas Instruments, Hewlett-Packard, Osborne, and IBM. "We couldn't do exclusives with anybody because we're a basic source of business and financial information in this country," explains Dunn. "Some people think we're a monopoly; we consider ourselves a monopoly of excellence, but there's a fine line legally on restricting basic information from the public."

Now, with business and financial news on-line, what about stock quotes? Associated Press files created for newspaper publishers could be, with the interactive work necessary for linking personal computers back to the quote source, provided to subscribers. In 1979, Dow Jones, acting as a subcontractor for AP, added that service. The problem was that AP, essentially a nonprofit organization run by some fifteen hundred newspapers, wasn't measuring up.

Summary of Dow

Once issued a password, users access News/Retrieval databases directly, bypassing menus, with a preceding // followed by the database name.

Free Service
Intro
//Intro
Free on-line information about News/Retrieval, including new database announcements

Dow Jones Business and Economic News
Dow Jones News
//DJNews
Stories ninety seconds to ninety days old from the *Wall Street Journal*, *Barron's*, and Dow Jones News/Retrieval Service

Free Text Search
//FTS
Search Dow Jones News stories back to June 1979 using any combination of words, dates, or numbers

Weekly Economic Update
//Update
Review of the week's top economic events

Wall Street Journal Highlights Online
//WSJ
Headlines and summaries of major stories, including page-one news, front- and back-page features, market pages, editorials and commentary

Dow Jones Quotes
Dow Jones Quotes Current
//CQ
Common and preferred stocks and warrants, corporate and foreign bonds, mutual funds, options, U.S. Treasury issues

Historical Dow Jones Averages
//DJA
Historical data on all four averages by specific date or twelve-day period

"The response rate was horrible," recalls Dunn, "and we were selling in the name of Dow Jones." To protect that name with the service its customers expect, the company had to go into the quote business. A system was designed that brought information in from the various exchanges, carefully edited for accuracy. "So Dow Jones was going to have a quote service," beams Dunn, "and, man, it was going to be fantastic."

But a quote is a quote is a quote. How would a Dow Jones quote differ from a Bunker Ramo or an AP quote? IBM opens, closes, and shows the same volume regardless of who reports it—unless one could analyze or otherwise manipulate various data with a little software, maybe something Apple could publish as the *Dow Jones Portfolio Evaluator*.

With the reorganization in 1980, the Dow Jones Information Services became essentially an entrepreneurial group allowed to find its own way. Software development, independent marketing, and technical and editorial directions could be explored by old guard and young Turks with the new organization and more people.

In July of 1980 Dick Levine left the Washington bureau of the *Wall Street Journal*, on which he'd worked for almost fifteen years, for a

Jones News/Retrieval Databases

Dow Jones Quotes/Historical
//HQ
Daily volume, high, low, and close in monthly summaries to 1979; quarterly summaries to 1978

Financial and Investment Services
Disclosure II
//DSCLO
Company profiles, detailed data on more than six thousand companies; SEC filings

Corporate Earnings Estimator
//EARN
Latest earnings-per-share forecasts of top Wall Street analysts covering twenty-four hundred companies

Forbes Directory
//FORBES
Rankings of largest U.S. corporations by sales, profits, assets, and market value; profitability and growth rankings for forty-six industries

Media General Financial Services
//MEDGEN
Detailed corporate financial information on 3,150 companies, including earnings, revenue, dividends, volume, ratio, shareholdings, and price changes

Weekly Economic Survey
//MMS
Weekly economic survey from the nation's top financial institutions, including median forecasts of monetary and economic indicators

General News and Information Services
Academic American Encyclopedia
//ENCYC
Comprehensive reference, revised and updated every six months

Master Menu
//MENU
On-line listing of databases with instruction on how to access them

Cineman Movie Reviews
//MOVIES
Reviews of latest releases updated weekly; previews of coming attractions; reviews of old movies back to 1930s

World Report
//NEWS
Foreign and national news

Sports Report
//SPORTS
Stories, scores, stats; schedules for professional, major college, and top amateur sports

Comp-U-Store
//STORE
Electronic shopping service for more than fifty thousand products; order electronically with bank cards

Symbols Directory
//SYMBOL
Listing of more than twelve thousand symbols used to access investment databases

Weather Report
//WTHR
Weather tables for more than fifty major cities, national weather summary, and forecast by geographic region

Wall $treet Week Online
//WSW
Transcripts from the four most recent *Wall $treet Week* television programs

nonexistent editorial department in the Princeton office. "I didn't know what to do and my bosses didn't know either," recalls Levine, from a clutter of tickers and terminals in the newsroom, now a beehive of activity with one wall lost to a huge map of the world.

One of his first requests was for a typewriter. "I didn't know what I was going to do with it," he says, "but I just felt better having it around."

The first task, for which the typewriter was no help, was getting journalists and computer people to speak the same language. "And journalists had to be designers," adds Levine, "defining what we wanted to do. There were no rules, and no cookbook to look into for the recipe."

And there wasn't a large pool of people with experience in the field. Levine hired one editor who'd spent a year preparing the *Columbus Dispatch* for the CompuServe electronic information service and another who'd been technology editor for the *New York Times*.

Now, three years later, the department consists of about thirty editors, database writers, copyreaders, and news assistants. At any given moment, three people are "sort of monitoring the world," says Levine, seven days a week, in a roadside building that looks like a storefront compared to its next-door parent in black glass. But this is where the action is.

News off the UPI wire is quickly edited, condensed, or rewritten, then formatted to fit CRT screens. With a push of a button, it's fed to mainframe computers in an adjoining room where it's made available to subscribers within minutes of its receipt on the UPI newswire. A technical department of some sixty people provides round-the-clock monitoring of the room full of Digital Equipment computers used for processing and a second, larger room, which looks for all the world like a Laundromat, full of IBM hard-disk storage.

The initial emphasis was on adding databases valuable to the serious investor. By the end of 1980, the Media General Financial Services was on-line with detailed corporate financial information that by 1983 would include nearly thirty-two hundred companies and one hundred eighty industries, with fifty-two statistical indicators such as revenue, earnings, dividends, and so forth. In 1981, seven more financial-services databases were introduced, ranging from the Corporate Earnings Estimator to transcripts of *Wall $treet Week*.

Twelve databases were added in 1982, including World Report.

From UPI, foreign and national news is selected, edited, and ranked by importance by News/Retrieval journalists so that subscribers can gain access to headlines, the World Report "front page," and some fifty stories a day, each averaging three "pages," or screens.

"It's tough now to decide what databases to offer," says Levine. "In the beginning we went around knocking on doors." Now, of course, information companies anxious to get on the Dow Jones service are knocking on their door. Hundreds of database proposals have been reviewed, but the selection process insists on both quality and added value. "We don't want our material simply to rehash what's in print," adds Levine. "If we can't add value to delivering news and information electronically, we don't do it."

Internal resources are far from exhausted. There is still lots of material within Dow Jones that may yet find its way to a screen. The *Wall Street Journal* is publishing Asian and European editions with only limited portions available through News/Retrieval, and relatively small amounts of *Barron's* are on-line.

There are plans. In coming months the full text of the *Wall Street Journal* will be offered electronically, as will an economic dictionary. And because the basic language of business is English, Levine expects to see as much interest in News/Retrieval from foreign publishers as from American. "I fully expect our service to be international in scope," he says. Development work is currently proceeding on an arrangement with the leading Japanese news agency that will allow Dow Jones News/Retrieval to provide same-day coverage of the Japanese economy. Time differences will permit approximately forty Monday stories from Japan to be translated to colloquial English and presented on-line at 9:00 a.m. Monday morning in New York.

Sports and weather databases were added in 1981, with the realization that in-home delivery went to subscribers with interests other than business and financial. In 1982, movie reviews and the twenty-eight-thousand-article Academic American Encyclopedia went on-line.

Grolier's encyclopedia, the first new one in ten years and designed from the outset for electronic access as well as print, is updated every six months. "It changes the nature of what an encyclopedia is," observes Levine. "It's not static anymore." It's a news tool, for one thing. When a brave dentist named Barney Clark volunteered for a polyurethane heart implantation, the story on News/Retrieval was cross-referenced to its encyclopedia's four-page article about the artificial heart.

"We married the news item to the reference," says Levine, a dramatic instance illustrating his conviction that the whole of News/Retrieval should be greater than the sum of its parts.

When the Comp-U-Store shoppers' database was added in January 1983, the staff of Dow Jones News/Retrieval were concerned about the appropriateness of their organization's name; shopping was the farthest they had gone yet from the service suggested by the name.

Debates on name change ceased when marketing surveys revealed that the name now has recognition even by people who don't use on-line services.

Director of marketing Tim Turner is more concerned with supporting the growing number of subscribers. The first means implemented was customer service. With some three hundred thousand calls this year, a staff of thirty was trained to answer questions about software and the News/Retrieval service on three 800 numbers from 8:00 a.m. to 11:00 p.m. EST, Monday through Friday, and 9:00 a.m. to 5:00 p.m. Saturdays.

A long-term plan calls for off-loading high-use databases to specific geographical areas through the packet-switchers now in use: Tymnet, Telenet, Uninet, and Dow Jones's own DowNet, with nodes in Princeton and soon in New York City. Dow Jones was the first private company licensed by the FCC to own and operate satellite earth stations, used for the *Wall Street Journal*'s seventeen plants across the country and mainly at night. News/Retrieval will be using this large satellite communications system before the decade is out.

But it's the software that more immediately serves subscribers, allowing users automatic log-on, access to all News/Retrieval databases, and extraction of specified financial data, with off-line charting, graphing, and other manipulations. The initial product line developed under the Dow Jones label consisted of three investment analysis soft-

ware programs, *Market Analyzer*, *Market Microscope*, and *Market Manager*, which were introduced to Apple users in September 1982. They were transported this year to the IBM pc along with a new program, the *Dow Jones Reporter*.

Coming events include two packages presently under development and scheduled for release soon. One will permit users to manipulate News/Retrieval data with *VisiCalc*, *Multiplan*, or *1-2-3* spreadsheets, permitting individual creativity that the charting packages prohibit.

''And,'' says a youthful Steve Bertges, product development manager and one of Dunn's young Turks, ''we're real excited about a program that's going to let users go into the service with preformatted requests with a single command, a sort of personalized clipping service of what's happened to particular stocks, without having to rekey the stock symbols for each news item.'' This package will perform a file search of the entire Dow Jones host, automatically paging through a stock's performance, estimated earnings, headlines, disclosure, or whatever has happened to that stock since the previous information request.

Bertges is excited about the software, Turner about the expanded and specialized customer service department, Levine about new databases, and Dunn about everything. But there's another department, only six or seven people, headed by low-key, soft-spoken Skip Grossman.

''We have interactive cable service in place in five cities,'' says Grossman, ''and we've reached agreement with twelve operating companies, including eight of the thirteen largest cable operators in the country, covering nearly thirty communities, with well over 1.25 million potential passengers.''

Because Dow Jones News/Retrieval over two-way cable lines is a flat-rate service, cable subscribers, according to Grossman, access the service from ten to thirty times more than computer users. ''They don't worry about how much time the kids spend using the encyclopedia,'' he adds. ''There's no issue of, good grief, how much is the bill going to be.''

While price schedules for computer access range from as much as $1.20 a minute for financial information in prime time (but as low as thirteen cents after 6:00 p.m. and on weekends), cable subscribers pay twenty-two dollars a month for unlimited access to the general news and information services and restricted access (evenings and weekends) to financial and business news, quotes, and *Journal* highlights. Around-the-clock access to everything is fifty dollars.

Both rates include the rental fee for the keyboards that Dow Jones had constructed by RCA because there wasn't any off-the-shelf hardware.

This bargain now being snapped up in Fort Lee, New Jersey, and Clearwater, Florida, plus Fort Worth, Texas, and suburbs of Houston and Dallas, will soon be available in Grosse Point and Dearborn, Michigan, as well as in some Boston suburbs. Other sites on the drawing board include Chicago, Saint Paul/Minneapolis, Tampa, Alexandria, Maryland's Montgomery County, half of Staten Island, and Orange County, California.

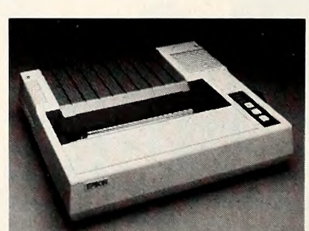
But whatever happened to the plan to sell Dow Jones News/Retrieval to corporations? Well, that's gotten off the ground, too. ''Fireman's Fund is using it,'' reports Tim Turner, ''and Northwest Industries. Peat, Marwick and Mitchell's ninety-three offices have it at a corporate rate. J.C. Penney's corporate computer is going to be hooked to ours. And Digital Equipment Corporation uses News/Retrieval to demonstrate the capabilities of their own equipment.

''On one side of the ledger we're kind of bullish and egotistical, but it's humbling when you figure that two hundred fifty thousand subscribers is less than 4 percent of the readership of the *Wall Street Journal*.''

Humbling? Don't try to tell that to the people who write mission statements with hardly less immodesty than this ad for the Dow Jones wire service published November 14, 1898, in the *Wall Street Journal*:

''Quick as a Flash! We give quotations, telegrams, cables, and all kinds of news affecting the markets. Page printers are the latest electronic device. News carried by electricity printed by electricity. No banker or broker can well afford to be without our Financial News Service. Dow, Jones & Co.''

Pretty cheeky. Some things never change.



Mind Your Business

BY PETER OLIVIERI

Hello to all of you old and new Mind Your Business fans; welcome to another column chock-full of interesting and valuable information!

For some time now, we've talked about compiling a list of useful utility programs that members of our Business User Group would appreciate knowing about. To date, however, there's been zero response to our requests for input. That's right, folks . . . zero response. Perhaps the explanation for this surprising turn of events lies in the fact that the meaning of the term "utility program" is unclear. To clarify, almost any piece of software that helps you in your day-to-day activities will qualify; a utility program might be a sorting program, a program that formats your own programs in a certain way before printing them, an envelope addresser, or a program that tells you how much free space remains on a disk. So let's go, folks; share your successes with your fellow B.U.G.s!

Micro Modification? Most of us would agree that the microcomputer was a great idea. We'd probably say that it serves us relatively well in the areas that we use it. Despite our positive feelings, it's also probably true that most of us can think of ways we'd like to redesign certain aspects of the microcomputer to make it do an even better job of meeting our specific needs.

One aspect of the Apple that we've talked about wishing we could redesign is the keyboard. Why, we've wondered, couldn't we make each key whatever we wanted it to be? That's now quite possible on the Apple IIe, which provides several programmable keys. But what if you don't have a IIe and you see a need for programmable keys, or what if you own a IIe but you want more programmable keys—a whole keyboard worth?

Well, when opportunity knocks, in steps an entrepreneur. There are now several vendors who offer separate programmable keyboards for the Apple. One such company is Creative Computer Peripherals, maker of the KeyWiz VIP, a user-programmable keyboard. While some computer users will think of a product like this as an unnecessary frill, others will deem it indispensable.

The KeyWiz is one of those products that significantly increase the flexibility of your machine. It's about the size of your regular keyboard, and it attaches to the Apple by means of an interface card placed in an available slot. On the interface card is a wire that must be connected to the Apple keyboard. This procedure is a simple one and shouldn't take more than about fifteen minutes, and the instructions for completing it are clear and concise.

Once the hardware is connected, you have the equivalent of four additional keyboards for your computer. (By the way, hooking up the KeyWiz does not disable your Apple keyboard the way some keyboard attachments do.)

The keyboard has thirty-one programmable keys. There are two other keys: One allows you to select one of four new keyboard designs, and the other is used in establishing what you want a given key on one of your new keyboards to represent. An LED light keeps you informed of which keyboard you're using.

Essentially, here's how the setup works. You decide what each key on a new keyboard will represent. A single key can represent a letter of the alphabet, a *VisiCalc* command, or a complex word processing maneuver. Each key can be programmed to stand for as many as eight keystrokes. Thus, this is a product whose applications are limited only by your own creativity and imagination.

By the way, despite how it may sound, "programming" a key is by no means a difficult task. You simply press P (for program) on the new keyboard, hold down the key you wish to be programmed, and then use your main keyboard to enter up to eight keystrokes that will be activated when the new key is pressed. When you're finished, just press the P key again; that's all there is to it. You can learn to use this product in as little as fifteen minutes.

Actually, each keyboard has 62 programmable keys. The 31 keys can be used in combination with the shift key to produce another set of 31 keys. In other words, 248 programmable function keys are available to you that can be divided up any way you wish. You could set up sections of the keyboard for different purposes—word processing, spreadsheets, database management, or whatever, and commands that once required several keystrokes would now require only one.

If you do some programming you might want to make each key a particular word or command from the programming language you're using. Once things were set up, you'd press a single key for print, another for run, another for list. You could also create an adventure keyboard on which individual keys represented the various directions, another key stood for inventory, yet another specified that you wished to take something, and so on.

Several blank plastic templates that fit over the keys are supplied with the KeyWiz; these enable you to clearly label what command each key on each of your keyboards represents.

There's no software component to the package and it doesn't interact with your disk drive at all. Instead, it's completely self-contained, allowing you to reprogram any key, at any time, with any character(s) you can type in from your keyboard. Once you've done the necessary "programming," you're ready to use your new keyboard with your favorite software.

The memory that's used to remember the keyboards you create is nonvolatile; in other words, this memory is not erased when you shut off

your machine. Thus, once you've gone to the trouble to create a keyboard, it's there (stored on a chip in the hardware device) whenever you want it. And yet, you can change any key or keyboard at will. Essentially, this product never becomes obsolete because it may be reprogrammed for a new software system at any time. As new products become available, you can modify your keyboard to reflect the commands associated with them.

A Big Plus. The real advantage to this device is that it makes using the computer easier. It really does begin to add that oft-sought-after dimension of user-friendliness. In addition, the documentation is well done—it's brief, clearly written, illustrated, and actually readable.

The Key to the Key. KeyWiz VIP is not inexpensive; it retails for a little more than $400. However, it's an attachment that won't soon be obsolete, and, seen from this perspective, its value becomes more apparent. It can certainly make it easier to do word processing, spreadsheet applications, programming, repetitive data entry, and other tasks requiring extensive use of the keyboard.

So give it some thought. In a future column, we'll look at a customized use of the KeyWiz VIP in some business application areas. In the meantime, be advised: If you try this product yourself, you'll probably find it hard to put down.

Not Another Checkbook Program. That's precisely correct—*Money Street*, the next product we'll look at, is not just another checkbook program. Rather, it begins to resemble what we all wish checkbook programs were like. The reason checkbook-balancing programs have not found their way into this column before now is primarily that none have been very well designed.

Money Street, from Computer Tax Service, is a complete checkbook financial system that will run on a 48K Apple II Plus, a IIe, or an Apple III in emulation mode. Only one disk drive is required, but having two reduces the amount of time spent swapping disks. In describing this program, the important words are "financial system," since this program does more than simply track your checks and balance your checkbook. Let's look at some of the features *Money Street* offers.

First of all, the program is easy to use; even inexperienced computerists can become quite familiar with it in less than half an hour. And both novices and more experienced computer users will appreciate the many error traps that have been incorporated into the program.

Money Street allows you to handle an unlimited number of checking accounts. Checks and deposits can be sorted into business, personal, or tax categories you define (up to 100 categories are allowed), and year-to-date totals for 100 categories can be displayed. You can list a history of 2,400 checkbook entries showing the running balance, and you can create audit trails sorted by payee, date, entry order, amount, check numbers, uncleared items, or deposits.

The program is fast—with a two-disk system, scanning through an electronic file of 1,000 checks takes about two minutes and finding a canceled check from among 2,400 requires about one minute. Year-to-date totals for business, office, and home accounting can be printed, as can a trial reconciliation statement showing starting balances, checks, and deposits.

Money Street gives you what might be called a "real-time" database. As you add information about a particular category (for example, medical expenses), the year-to-date totals are calculated and displayed at the bottom of the screen; you see them instantly. You can also obtain an on-screen dictionary of all your category names. This dictionary contains all year-to-date totals, a count of items in each category, and subtotals for any categories you specify.

Other features of note: The program accommodates credit card accounting and allows you to split entries between category codes. In addition, it allows you to edit anything anytime.

When your monthly bank statement arrives, you can check to see whether the bank's records reflect what actually took place in your account. This allows you to keep close tabs on your deposits and checks—not a bad idea, since even banks have been known to make mistakes upon occasion.

Money Street makes available fifteen ready-to-print reports; among these are reports listing information in terms of monthly activity, individual payee, deposit, uncleared checks or deposits, checks by particular category, and so on.

Money Street is thorough, easy to use, well designed, and worth looking at. It is not without some limitations. You're allowed only 100

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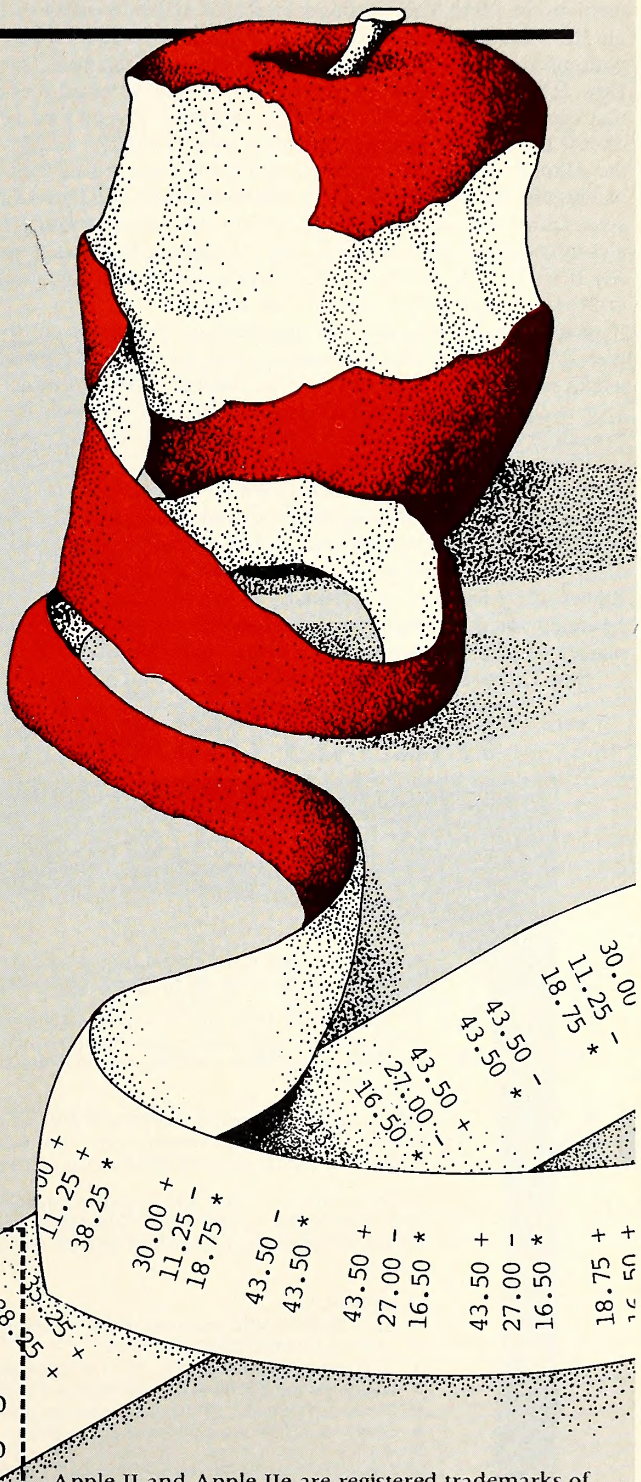

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category codes, and a data disk can't store more than 2,400 entries or more than 200 uncleared items. The check amount limit is $999,999.00. And, as the company's promotional literature states, *Money Street* won't replace your C.P.A., won't do your taxes for you, and won't do extended accrual accounting. It will gather data for general ledgers, payroll accounting, and journals, in addition to keeping track of your checks.

What Bugs B.U.G.s? Every now and then, members of our Business User Group register complaints. In the interest of sharing both good experiences and bad so that all may benefit, let's listen in.

Bug One. John Howson of Chappaqua, New York, writes to comment on the Mind Your Business review of *Micro/Terminal* for the Apple III. What concerns Howson is the product's limited capacity to deal with information downloaded from a commercial database (such as the Dow Jones News/Retrieval Service). Although the amount of material that can be downloaded is virtually unlimited, he can find no way to review the data (by running through it with the cursor) except by using the editor to reload the data back into RAM from a disk file. Unfortunately, the *Micro/Terminal* editor can handle only 200 lines of text, and since Dow Jones and other programs often use double and triple spacing and forty-column lines, 200 lines isn't all that much. Howson wonders if any B.U.G.s who use this product have come up with any ideas, tricks, or utilities to make the whole process easier.

Bug Two. Howson also has some feelings to share about *Word Juggler III*. He wishes that the software had a line-counting device that would enable the viewer to know the number of lines on each page as soon as the first portion of each page is displayed. He feels that this information is important to have when you're attempting to position text vertically on the page for proper appearance. In addition, Howson reports he doesn't rate the documentation as highly as the Mind Your Business review did. His biggest complaint is that, although the tutorial sessions covered a lot of ground, nowhere in the manual was there any clear explanation of the real parameters of many of the functions. Rather, there are general references to lots of things, and readers must figure out the parameters for themselves. He feels that more specific explanations would have made for a more "user-friendly" manual.

Bug Three. But three isn't really a bug; it's a comment on *Word Juggler* that fits in rather well at this point. David Bolduc of Austin, Texas, writes to say how much he likes *Word Juggler*. Bolduc, who has used *Apple Writer III* and a number of Apple II word processing packages, praises *Word Juggler*'s documentation, packaging, data-file merge capability, display modes, and user template. He feels that the program is easy to learn, easy to use, and very powerful. He also appreciates the way it interfaces with *Mail List Manager* and feels that the support given by Quark Engineering has been exceptional.

B.U.G. Request for Help—Two Possible Answers to One Question. R.H. Urban of Ridgefield, Connecticut, has some helpful suggestions for Harding Rees. Rees had been having trouble getting a single line feed when using the Epson with *Quick File III* and *VisiCalc III*.

According to Urban, the difficulty probably stems from the setting of the DIP switch on Rees's printer that controls line feeds; it is probably set to "on." Since the software Rees is using normally sends line feeds, the redundancy causes a problem. Another possible source of the problem is the printer interface card. Most Epson printers have a parallel interface card. It's possible that the card on Rees's Epson has a "hard" switch that is generating a line feed in addition to the one being generated by software.

In either case, the problem is not specifically related to combining the Epson and these two software packages. Urban has been using both packages with his Epson MX-80 and the Apple III Universal Parallel Interface Card, and he has not had a problem with extra line feeds. The Apple III UPIC card has a switch that is set to auto. It works properly with an extensive array of Apple III software and suppresses double line feeds when software is being used.

Help One. Steve Kipperman, a San Francisco B.U.G., would like to interface his Apple with his new IBM DisplayWriter and would like to know what hardware and software might be most appropriate for accomplishing the task. Moreover, Kipperman would be pleased to hear of ways of enabling the DisplayWriter to communicate with other word processors. Can a fellow B.U.G. provide some guidance here?

Help Two. Evans Harrell of Marietta, Georgia, has an Apple II Plus with a Videx 16K expansion card. He is attempting to interface *Apple Writer II* with an Okidata 92 Microline printer and is running into some

difficulty. (He has had similar problems getting *Super-Text 40/80* to function with his printer.) The main problem is that Harrell can't seem to find a way to embed the ASCII character strings and the control commands the Microline printer requires in text.

Also, Harrell finds that he must initialize with control-V control-I 80n control-V in order to get a printout wider than forty columns. If he uses a capital N as the initialization command suffix, he gets seventeen characters per inch printed, whereas if he uses a lower-case n, he gets ten characters per inch. If he attempts to bury the control-I 80N in the text, he can't return to ten characters per inch by means of control-V control-I 80n control-V. Neither of these command sequences seems to relate to the Okidata Microline 92 instruction book.

In *Apple Writer II*, the command for continuous underscore is the backslash (one to start and another to stop). When Harrell attempts to use this command he gets an underscore consisting of dashes, not a continuous underscore. He is also having trouble getting the superscript and subscript functions to work.

C'mon, all you talented B.U.G. members; let's help this guy out. Do your good deed for the day; write now.

Help Three. Nelson Capes of Shreview, Minnesota, has an unusual question for B.U.G. members. He owns a very early model Apple III (serial number 263) that he bought in 1978. Now he's thinking about upgrading to a IIe or a Lisa. About six months ago, a local Apple dealer suggested that his Apple might be worth more than he paid for it, because it might be a collector's item. No one else seems to know whether this is the case. While the current drop in price for the Apple III makes it difficult to believe that this machine is worth a lot, Capes would hate to let it go for too low a price. Any suggestions?

User Update. Jim Pittman, Jr., of Albuquerque, New Mexico, has written to this column once before. Now he's offering an update on his experiences with a few products. First of all, he uses *Super-Text Professional* and is extremely pleased in nearly every way. (There are some drawbacks, such as the fact that the program doesn't take advantage of an installed 16K card, does not support proportional or bidirectional printing, and has a fairly small workspace, but these matters are all minor to this satisfied customer.

Pittman bought his Apple and the original *Super-Text* in May 1980 and had some difficulty learning the original version, perhaps because he was a new computer user at that time. He has now bought every new version of *Super-Text* released so far and feels that each new version has retained the positive features of earlier versions while adding enhancements and doing away with negative features. He feels that he might be prejudiced in favor of *Super-Text Professional* because he has developed along with it. Nonetheless, he feels that this program offers many features that other word processors lack.

Pittman recommends that *Super-Text* users purchase a program called *Lexicom* from MicroSparc. This program quickly translates between Apple 3.3 DOS text files and *Super-Text* binary files. He also believes that it's essential for Apple owners to have a lower-case adapter. He has used the Dan Paymar adapter successfully but now has the Videx Keyboard and Display Enhancer and is quite pleased with the extra capabilities it provides. He does mention one annoying feature: Hitting the control key puts you into upper-case lock mode but there's no indication of this on-screen. Pittman put in a call to Videx and was able to obtain information on how to disable this feature.

One More Minute. Many readers have commented on the usefulness of the *Minute Manual*, designed to clarify how to use the Epson with a word processing program. MinuteWare recently announced the availability of a *Minute Manual* for *DB Master*. In keeping with the original concept for these manuals, it is readable, informative, and concise. *DB Master* is an excellent program, but its manual is difficult to master. Perhaps this new publication will help some older and new users of the program.

Computer Tax Service, Box 7915, Incline Village, NV 89450; (702) 832-1001. Creative Computer Peripherals, Aztec Environmental Center, 1044 Lacey Road, Forked River, NJ 08731; (609) 693-0002. MicroSparc, 10 Lewis Street, Lincoln, MA 01773; (617) 259-9710. MinuteWare, Box 2392, Columbia, MD 21045; (301) 995-1166. Muse, 347 North Charles Street, Baltimore, MD 21201; (301) 659-7212. Videx, 897 N.W. Grant, Corvallis, OR 97330; (503) 758-0521.

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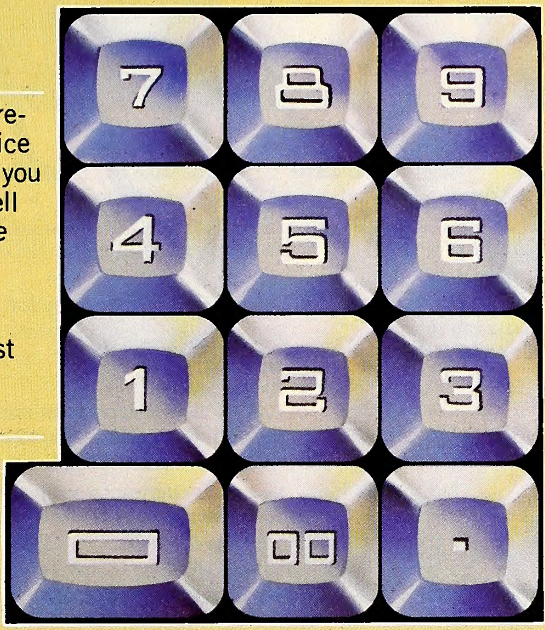

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Part 4: About Assembling

Have you ever wondered why we call it "assembly language"? Or what it is, exactly, that is being "assembled"? *Assemble* is one of those computer words (like *boot* or *RAM*) that only begin to make sense when you know where they came from.

We could start by saying that what is being assembled is an assembly language program, and it would be true, but it wouldn't help you much. Why (you might ask) do we say "assemble" instead of "compose" or "construct"?

But no: We will go 'round the circle one more time, by answering the question we started with; and then we will begin to make sense of all this. We call it assembly language because it is a language that was designed to assemble programs in.

The key concept is this: You assemble something out of preformed pieces. You can select from a variety of pieces with different shapes and functions, but you must use them as they are; you cannot change them. However, if the pieces (and the rules for assembling them) are well designed, you will be able to build strange and wonderful things with them—depending on how you put them together.

In assembly language, then, the pieces are the various instructions that can be executed by the microprocessor. What you can build by assembling those pieces is an assembly language program.

Still sounds circular, doesn't it? Okay, here's what it's all about: There was a time when assembly language was the only language available. In the early days of microcomputers, very few systems had Basic (Apple was one of the first to offer it as a standard feature), so if you wanted to write programs for your system, you had your choice of assembly language or machine language.

The trouble with machine language is, it's all numbers, and, in the form you would enter them into the Apple, hexadecimal (base sixteen) numbers at that. A *word* of machine code is actually an electronic signal; but it's usually represented on paper as a pair of hexadecimal digits, such as $20 or $A9. Note that the dollar sign has nothing to do with money in this case: It indicates a hexadecimal number.

We humans are not trained to think in numbers like that, so assembly language was invented: A standardized set of "code words" that represent the numbers of machine language. Thus you could write and edit your program in the more human-oriented symbols of assembly language and then turn the result into machine language by a simple substitution process.

The Microprocessor. Any program, no matter what language it's written in, is a set of instructions for the computer. The part of the computer that deals with instructions is the *microprocessor*. This is a large integrated circuit chip, the "brain" of your Apple: It reads instructions in memory, makes decisions based on those instructions, and directs most of the other chips in the system.

Any programming language—Basic, Pascal, Forth, or whatever—must ultimately talk to the microprocessor. In fact, that's what a higher-level programming language is for: to make it easier for humans to give instructions to a computer (which means, with the Apple, to the microprocessor chip). The nice thing about assembly language is that it's structurally similar to machine language (the "language" of the microprocessor itself—those electronic signals mentioned earlier). Structurally similar means, in effect, that it uses the same rules. The words of the two languages are different: The machine uses numbers (of course), while we use real words (well, almost); the words of assembly language can be translated directly and easily to numeric, machine language, form.

Here it is in a nutshell: The words of assembly language correspond, almost one to one, with the instructions that the microprocessor circuit can "understand" and execute.

Instructions and Addresses. The words of assembly language are a set of three-letter abbreviations for the various microprocessor operations. For example, JMP stands for jump, the assembly language equivalent of goto. LDA is short for load accumulator, and STX means store X register. The words are designed to be easy to remember, so they are sometimes called *mnemonics*. In this sense, mnemonic means a memory aid.

Each word—each microprocessor operation—must refer to a particular address: A source or destination must be specified for the data in the operation. That is, each word must be accompanied by a number (with a few exceptions). The word tells the microprocessor what to do, and the number tells it where to do it.

Thus a complete statement in assembly language consists of a word

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and a number: technically an *operator* and an *operand*. For example, LDA 10 means "load the accumulator with the number stored at address 10"; STA 20 means "store the number in the accumulator at address 20"; LDX #30 means "load the X register with the number 30" (the # mark means that the number is the data itself, not the address where the data can be found).

Writing It Down. There is a standard format for writing assembly language. It's written in lines, like Basic, but there the resemblance ends. A Basic line can contain almost anything you want, but it must have a line number. A line of assembly language can contain only certain specific things, in certain specific places.

The general rule is, one "complete statement" per line: one operator (word) to each line, with its associated operand (address or number); and anything else that is appropriate, such as a label or a comment. Thus the shortest possible line of assembly language would be one of the few operators that do not require an operand, such as NOP, short for no operation.

More often, a line will contain two items: an operator and an operand. For example, LDX #4 is "load the X register with 4"; and JMP LOOP means "jump to the address stored under the label LOOP." The operator and operand are usually placed in the middle of the line. If you enter a few lines like these, you'll see that they make a column (well, two columns close together) down the center of the screen.

Frequently, a line will also have a third item: a *comment*. This is an explanation of the line for the programmer's information (similar to a rem in Basic). In most formats, anything to the right of the operand in a line of assembly language is a comment. For example, "JMP LOOP Do it again" or "LDX #4 Set counter to 4."

Sometimes a line will also define a *label*. The label will be to the left of the operator, in a column of its own; and if you're using an assembler program, it will remember this line as the one to come back to when you say (later on) "JMP LABEL." Here's a line with a label and a comment: "LOOP LDX #4 Set counter to 4."

Dissecting a Listing. Consider the accompanying listing: This is a program we developed last month that outputs a string to the screen. We have divided the listing into columns (marked A through G, along the bottom), in order to show what goes where. The listing was produced by A.P.P.L.E.'s *Big Mac* assembler program, which is very similar to Southwestern Data Systems's *Merlin*; most assemblers will produce listings in a format very close to this.

To start with, consider column C: These are the line numbers. With most assemblers, you don't enter these numbers; the assembler's editor provides them automatically. They're used for reference in editing the program; they aren't part of the program itself. They can't be used as the operand of a JMP the way line numbers are used with goto in Basic. They won't appear in the final machine code version. We will use these numbers to refer to various lines in the program during our discussion.

In this format, column C serves another useful purpose: It separates the assembly language from the machine language. Yes, those funny numbers in column B (it looks like three columns) are machine code, but we'll get back to that later. The columns to the right of C are the assembly language program.

The operators, or microprocessor commands, are in column E, in the center of the listing. This is where the "business" is done. Every line in the program has an entry in this column (a few blank lines have been added to the listing for readability; but they are not part of the actual pro-

```
                         1                 ************
                         2                 *          *
                         3                 *  STRING  *
                         4                 *          *
                         5                 *  OUPUT   *
                         6                 *          *
                         7                 ************
                         8
                         9                         ORG     770
                        10
                        11   COUT                  EQU     $FDED       APPLE CHAR OUT ROUTINE
                        12
0302:    A2 00          13   ONE                   LDX     #0          CALL 770
0304:    4C 0E 03       14                         JMP     LOOP
0307:    A2 04          15   TWO                   LDX     #4          CALL 775
0309:    4C 0E 03       16                         JMP     LOOP
030C:    A2 08          17   THREE                 LDX     #8          CALL 780
                        18
030E:    BD 1D 03       19   LOOP                  LDA     STRNG,X     GET NEXT CHAR OF STRING
0311:    C9 0D          20                         CMP     #13         IS IT 'END' CHAR?
0313:    F0 07          21                         BEQ     EXIT         IF SO, FINISHED: LEAVE
0315:    20 ED FD       22                         JSR     COUT         IF NOT, OUTPUT IT
0318:    E8             23                         INX                 ADVANCE COUNTER
0319:    4C 0E 03       24                         JMP     LOOP        DO IT ALL AGAIN
                        25
031C:    60             26   EXIT                  RTS                 RETURN TO CALLING PROGRAM
                        27
031D:    CF CE C5       28   STRNG                 ASC     "ONE"       FIRST STRING
0320:    0D             29                         DFB     13            END MARK
0321:    D4 D7 CF       30                         ASC     "TWO"       SECOND STRING
0324:    0D             31                         DFB     13            END MARK
0325:    D4 C8 D2
0328:    C5 C5          32                         ASC     "THREE"     THIRD STRING
032A:    0D             33                         DFB     13            END MARK

  A         B            C     D                     E       F           G
```

The Columns in an Assembled Listing

gram). Note that this column is made up entirely of three-letter words or abbreviations: You will see LDX, LDA, and JMP among them.

For every operator in column E, there is an operand in column F (with two exceptions: We'll get back to them later). These operands identify the data that the operators will work on. For example, the data for line 13 is the number 0, and the data for line 14 is the address called LOOP, which is specified in line 19.

Column D is for labels. If a word appears in this column on a particular line, then you can use that word elsewhere in the program to refer to that line. For example, line 19 has LOOP in the label column; and lines 14, 16, and 24 jump to the label LOOP—that is, to line 19.

For another example, line 21 jumps to the label EXIT—sometimes. BEQ is short for branch if equal. Line 20 makes a comparison test (CMP is short for compare), and then line 21 either jumps to line 26 or advances normally to 22, depending on the result. The two operators, CMP and BEQ, acting together are similar in function to *if A = B then goto* in Basic.

By the way, line 26, the EXIT line, uses one of the few operators that do not require an operand. RTS is the equivalent of return in Basic, so no operand is needed: Thus there is nothing in column F on line 26.

Column G contains the comments. Like rem statements in Basic, these explain what is going on. They are for the programmer's benefit only and will not become part of the machine code.

The Machine Code. So much for the human viewpoint; now let's take a look at what the Apple sees. Note that all the numbers to the left of the line numbers are in hexadecimal, even though they don't have dollar signs.

Column B contains the complete machine language program. It's in the form of bytes, shown as two-digit hexadecimal numbers. Each number represents a word of machine code and will occupy one storage location in memory. There can be up to three bytes on each line.

Here is the secret (if you haven't guessed it already): The bytes in column B are the machine language translation of the assembly language statement in columns E and F of the same line. Column B is a direct, statement-by-statement translation of columns E and F.

Take lines 13, 15, and 17, for example: The assembly language version of each is LDX (something), and the machine code version is $A2 (something). From this you might guess that $A2 is the machine code for LDX, and you would be quite right (well, almost: Technically it's a specific form of LDX).

Now look at the other end of those same lines—the (something) part. In assembly language, they're #0, #4, and #8 respectively (remember, the # means "This is the data itself, not its address"); and in machine code, they're 00, 04, and 08.

In other words, a line of machine code is structured just like a line of assembly language: first the operator and then the operand. Sometimes this will require two bytes, as in lines 13, 15, and 17; sometimes it will require three, when a two-byte address is used for the operand (line 14); and sometimes it will need only one, when the operator is one of those that don't take an operand (line 26). Thus, there is always one byte for the operator; and there may be one, two, or none for the operand.

Column A is a list of memory addresses. On each line, the number in column A is the address at which the first byte on that line will be stored. Compare the addresses on two successive lines: You will see that they differ by the number of bytes in the first line. If a label is defined on a particular line (that is, if the label field on that line has a word in it), then that label will refer to the address in column A on that line.

Address Logic. In assembly language, memory addresses are usually given as four-digit hexadecimal numbers, as in column A (the program begins at $302, but the listing gives $0302). The hex numbers from $0000 to $FFFF cover the same range as the decimal numbers from 0 to 65,535—in other words, the whole memory field of a 48K Apple.

A byte of information—a word of machine code, or a number from 0 to 255, or something else—can be written as two hex digits, and an address takes four hex digits. Does that mean that an address can be written as two bytes? The answer is, yes *but*. . . .

Before we go any further, let's define a couple of terms: We're going to need good, solid handles on these ideas. We're not going to go through the whole rap on hexadecimal numbers (that's for another month), but we need a couple of highlights from it. We'll omit the logical

proofs and demonstrate mostly by analogy. Sorry about that, but it saves time.

In the familiar decimal number system, the position of each digit is important. In 25, the 2 represents 2 * 10, but the 5 represents only 5. In 246, the 2 represents 2 * 100. The further to the left a digit is, the larger the number it represents.

In mathematics, the term for this is *significance*: The most significant digit of a number is on the left, and the least significant is on the right. In the number 125,001, the most significant group is 125 and the least significant is 001.

Now we have the handle we needed. We can look at a four-digit hex number like $1234, break it into two bytes, $12 and $34, and say that the most significant byte (MSB) is $12 and the least significant byte (LSB) is $34. Thus, when you type an address in this form, you normally type it MSB first, then LSB.

The reason we need a good handle on this is that, in machine language, addresses usually fall in reverse order: LSB first, then MSB. The microprocessor likes to get the least significant byte first, for reasons we may go into some other day.

Consider line 19, which we have labeled LOOP. The starting address of this line, in memory, is $030E (column A); but the various lines that jump to it (lines 14, 16, and 24) all read 4C 0E 03—what happened to $030E?

Any time you write a jump instruction in assembly language, the machine code must have the address in the order LSB, MSB. If you use an assembler program, it will take care of that for you, but if you translate your programs by hand, don't forget to reverse the bytes.

Now that we've got that settled, take another look at line 19. This line also refers to an address: the address labeled STRNG. Looking in the labels column, we find STRNG on line 28; the address of line 28, in memory, is $031D. But the machine code for line 19 is BD 1D 03—once again, LSB first (after the operator, BD), then MSB.

Only one other address is referred to in the program, and that one is backward, too. The Apple's character output routine begins at $FDED, and our program jumps to it at line 22: 20 ED FD. Once again, the bytes are reversed.

If you use an assembler, it will probably take all of this off your hands. If you have to assemble and translate your own machine code, or figure out somebody else's, remember: Addresses must be entered LSB first, then MSB.

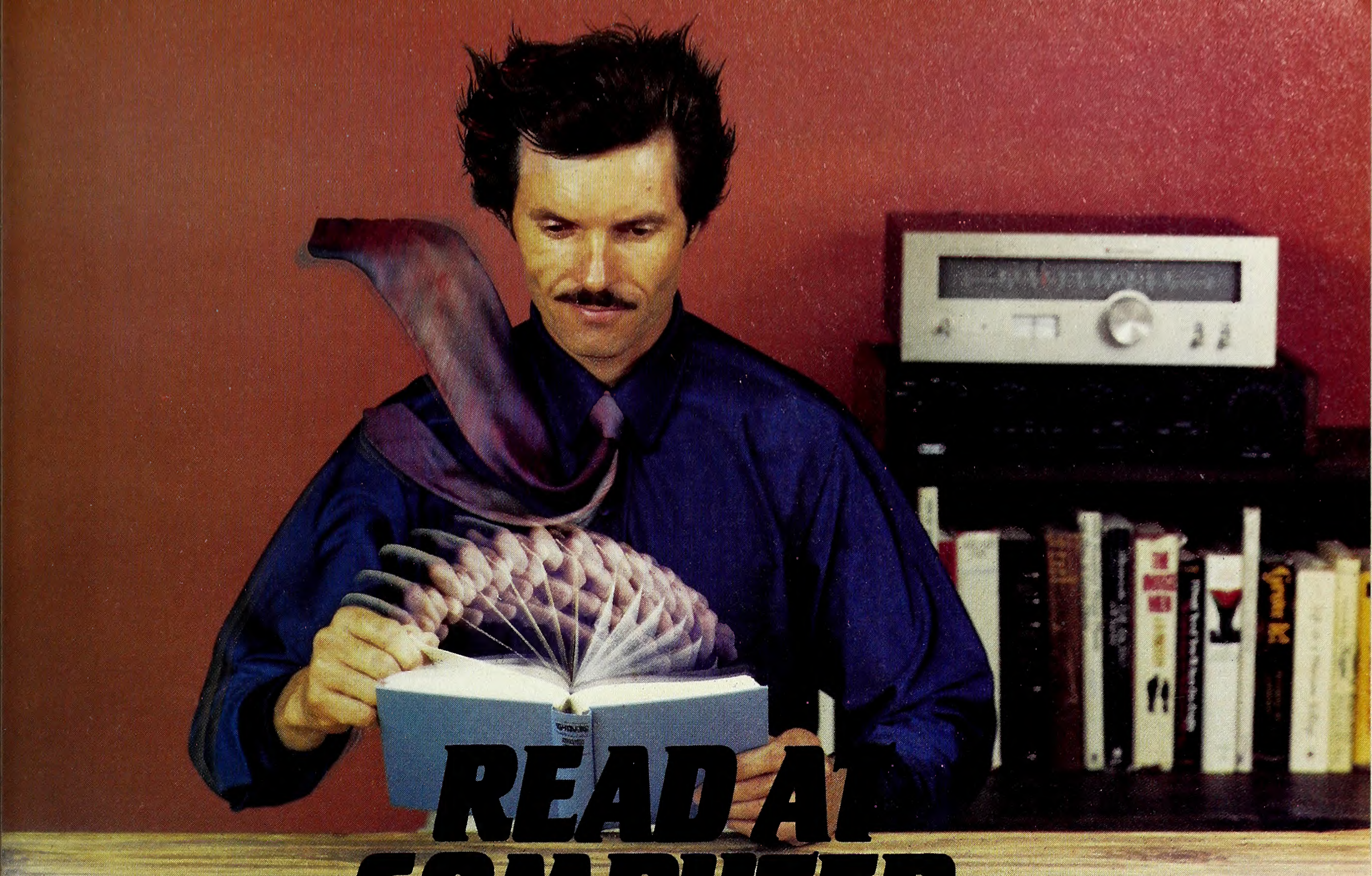
Source and Object. Before we leave the subject of assemblers, we should define two more terms. You won't run into them often, but they're part of "assembler literacy" and it may be convenient to know them. They are *source code* and *object code*—respectively the input and the output of the assembly process.

The source code is what the assembler program starts with—your input. You enter and edit a program in assembly language: This is the source program, since it is the source of the information that determines the final program.

The object code is what the assembler program produces—the object of the assembly process, as a logician would put it. In other words, the object code is the same as the machine code. In our listing, the object program is in column B; the source code is in columns D, E, and F.

Big Mac and *Merlin* record the source and object programs separately, on disk: They have the same file name, but the source file has .S appended to the name. The source file contains your assembly language program, which you can edit or modify as needed; the object file will have the machine language program, ready to brun or bload and call.

This two-stage process—first you write and edit the source code, then the assembler has to turn it into object code before you can run it—can be a bit of a nuisance; it's one of the things that make assembly language more difficult to work in than Basic (Basic is interpreted every time you run it). There is a corresponding advantage, however: Assembly language runs *much* faster, since it doesn't have to be compiled as it runs. It also takes up less memory space and has other advantages; for most Apple users, though, the main advantage is speed. If you want to write a tone generator, a light dimmer control, or anything else that operates in real time, assembly language is the only choice. ⌐■



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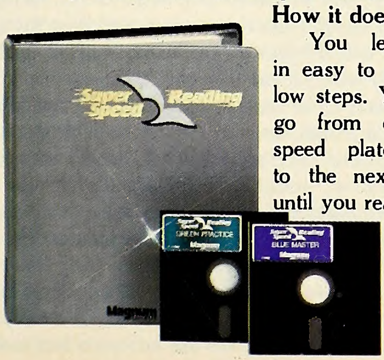

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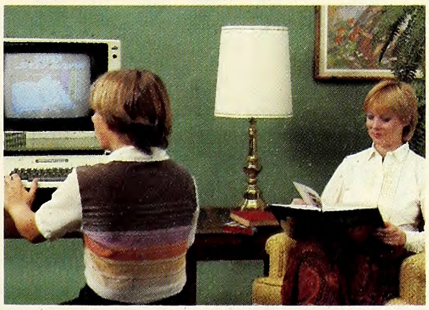

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Serious Work.

(And Some

BY JOHN JEPPSON

Writing a spooler for Apple III turns out to be one of those maddening little projects that just seem to get more complicated the longer you stare at them. A spooler is really a neat idea—and, in fact, a very simple one. All a spooler does is transfer a file from your disk to your printer. But it does so in the background, running by itself on a time-sharing basis, while you get to use the computer yourself for other things.

After all, printing is a slow process. Even a fairly fast daisy wheel printer, such as the Qume Sprint 5, prints only forty-five characters per second. This is pretty fast if you are trying to read along as it prints, but it's a snail's pace compared to the capabilities of Apple III. At forty-five characters per second it takes the better part of a minute to print a single page of text, so if you're running off twenty or thirty pages of manuscript you've got a bit of sitting around to do. If you want to double your frustration, that's easy. Just print two copies.

It wouldn't be so bad if the computer were really working all that time. But in half an hour of printing, the computer actually works only a few seconds, if that. The rest of the time it's doing just what you're doing: waiting for the printer. A spooler is designed to let you use the computer during that idle time, for whatever you wish to do. When the printer needs more data the spooler interrupts your activities for a fraction of a second, transfers a few bytes to the printer buffer, and goes back to sleep. You probably won't even notice the interruption.

So a spooler shouldn't have to be terribly complicated. You just load the file from disk, a chunk at a time, and dump it to the printer. In Basic it would take about four lines and three minutes to get such a program up and running. But that, of course, would miss the whole point; the Basic version would tie up the computer the whole time. What you want is a time-sharing program that will copy and print your file unattended, while you go on to other things. That's more complicated.

The serial printer driver that comes with Apple III does make an effort to minimize wasted time. If your program only sends a very short string of bytes to the printer driver, the bytes are accepted and stored in an output buffer. The driver passes them on, one byte at a time, to the

Spooling Around on the Side)

RS232 serial port and thence to the printer. But you don't have to wait, at least not yet. As soon as data is safely stored in the printer driver's output buffer, the driver returns control to your program. Subsequent transfer from printer driver to printer is done by an interrupt handler. When the printer is ready for another byte of data, an interrupt occurs. The interrupt handler takes the next byte to be printed from its output and dispatches it via the RS232 port to the printer. Meanwhile, between interrupts, your program has control of the computer. It can use that time to prepare another chunk of data that, in turn, is sent to the printer driver and stored in the output buffer.

As you can see, much of what we want from a spooler is already being done. If the printer can keep emptying the output buffer as fast as your word processor can fill it up, there is no wasted time. In that case a spooler does you no good at all. The computer is already working at full speed; there is no idle time.

The hooker is that the output buffer is only so big. In Apple's standard printer driver, the buffer's capacity is fifty-five bytes. Once your word processor has filled up this buffer there's no place else to go. The printer driver receives the next data byte, checks the output buffer, and finds it full. So the driver simply waits, in an endless loop, until the interrupt handler creates a vacancy by sending one of the previously stored bytes to the printer. That won't happen until the printer is ready. If your Qume Sprint 5 has run out of ribbon it may never be ready. So everybody waits. The word processor waits for the printer driver to relinquish control. The printer driver waits, in an endless loop, for room in the output buffer. And the interrupt mechanism waits for a signal from the printer that it is ready for another byte. And you wait for all of them.

In many printers, including the Qume Sprint 5, there is yet another step in this chain. The Sprint 5 also contains its own I/O buffer, 224 bytes of RAM memory. So the Sprint 5 keeps signaling to the computer's interrupt mechanism to send more data until its own memory buffer is nearly full. But this merely postpones the traffic jam. The word processor keeps dumping bytes into the head end of the chain for a while, but only until the Sprint 5's buffer is full at the other end.

Technically speaking there is a log jam at the RS232 port. Data bytes only pass through the RS232 port, en route to the Sprint 5 buffer, at the baud rate you have selected for the printer driver (usually 1,200 bits per second). This is a drastic speed reduction from what Apple III is turning out. But nevertheless data does keep flowing down the chain until the Sprint 5 buffer is within two characters of being full. Now everything really does stop. Everybody waits while the printer grinds away. Eventually, when the Sprint 5 buffer is within ten characters of being empty, there is a brief flurry of activity. The buffer gets refilled, and then everybody waits some more.

The crucial point for our purposes is that the wait loop is actually located within the printer driver. Somehow our spooler must avoid getting trapped in that loop. This means that the spooler must never send data to the printer driver unless it knows for sure that there is room in the printer driver's buffer to receive it. The standard printer driver has no provision for reporting the status of its buffers. But the RS232 driver does. Perhaps we could use that instead.

Unfortunately, it's not enough. The spooler must also gain control of the interrupt mechanism. Once control has been relinquished to the operator it will never again return to the spooler except by way of the interrupt mechanism. So, at the very least, we will have to write a new interrupt handler. But neither the standard printer driver nor the RS232 driver has any provision for replacing Apple's interrupt handler with our own.

Obviously we will have to rewrite the printer driver, or, what amounts to the same thing, incorporate all that I/O code in the spooler. It's possible that Apple may not have provided you with a copy of the source code for its printer driver (fat chance!). Fortunately, the RS232 port is quite easy to use. The necessary details are incorporated in the accompanying driver.

Creating a Disk File. Before your spooler can transfer a file from disk to printer the file must already be stored on disk. So when you actually sit down to write a spooler the first hurdle is convincing your word processor to send its text output to a disk file instead of directly to the printer driver. This sounds easy, but like everything else connected with spoolers it is beset with problems. You cannot, of course, simply "save" the file onto disk. All word processors do allow you to save the text you have been editing, but the resulting disk file is not printer-ready text. It is just an ASCII file with, perhaps, a few associated command bytes in some special code known only to your word processor. It will not print; at least not in any form you would approve.

When you do print from a word processor, a whole separate section of the program swings into action. The word processor must format text for the printer. It computes line lengths and inserts carriage returns. It generates line feeds, page breaks, left margin blanks, and all the other control information the printer will require. These are all inserted in their proper places in the text and the whole thing is sent off to the printer driver, usually one byte at a time. It is this output stream that you must somehow capture on disk.

Could you not then simply designate a disk file in place of .Printer? Unfortunately not. SOS draws a clear distinction between *block drivers* such as the ProFile and floppy disk drivers and *character drivers* such as .Printer. They are handled by different sections of the operating system, and they use different interface structures.

To prevent mix-ups each driver is assigned a type code and is therefore branded either as a block or a character device. The type code may be found in the device information block at the beginning of each driver's code. If the high bit of byte $17 is set, the driver is a block device; otherwise it's a character device. This information is also returned by the DInfo SOS call (#$85), so it's very easy for your word processor to find out what kind of destination driver you have told it to use. Since virtually all programmers have been taught that the innocent public must always be protected from its mistakes, and since this particular mistake is rather easy to detect, all Apple III word processors that we know of carefully protect you from making it, whether you want to be protected or not.

Would it work if you changed the type designation on a copy of the ProFile driver? Well, we haven't tried that, but we are confident that you will remember to back up absolutely everything before you do.

If the word processor wants a character driver, why not give it a character driver—one that accepts text output intended for the printer and stores it instead in a disk file. Notice that this function is independent of the spooler proper. The actual transfer to printer comes later, while you are busy with the computer doing other things. "Saving" the file may be carried out by a standalone character driver or may be combined with the rest of the spooler as a module. All that really matters is that the saver must be handled by SOS as though it were a separate driver. The word processor will then believe it is actually some newfangled type of printer with a fancy name. Modular drivers are well suited for the purpose. The modular construction allows you to write a single driver with several public faces.

All reasonable word processors expect printer drivers to be written in the conventional form outlined in *SOS Device Driver Writer's Guide*. The word processor will first open the driver and then write to it either one byte or several bytes at a time. When the entire text has been written, the word processor, if it is a well-mannered and properly brought-up word processor, will politely close the driver. We hope and assume that your word processor will do the same.

When the new driver, which we will call SpoolSave, is substituted for the printer,the first call it can expect to receive is the word processor's open call. Upon receiving this call the driver should, in turn, create and open the appropriate disk file. In order to do that it would appear that your driver must issue SOS calls to the ProFile or to the floppy disk drivers. But that is forbidden. SOS calls may never be issued from within the driver environment, and any attempt to do so will crash the system. Drivers are expected instead to use the Apple III event mechanism.

To use events, the driver calls a special subroutine in SOS that places an entry in the event queue. Once this is done, the driver may mark itself open and exit. Control will return to SOS. Normally it would then go back to the word processor. But in this case, before returning to the word processor, SOS notices that there is an event waiting. SOS transfers control to the event handler, which, of course, is a little subroutine you have embedded right there in SpoolSave. So you are back in control of the computer again, but now you are no longer stuck in the driver environment. Event handlers run in the user environment and may issue SOS calls. Now it's easy. The event handler creates and opens a temporary storage file on disk and then exits, allowing control to return, finally, to the word processor.

The word processor's next move is to begin sending out a stream of printer-ready text to what it thinks is the printer. Usually it will send one byte at a time. That is, the word processor will probably issue a separate DWrite SOS call for each byte in the output stream. *Apple Writer III* and *Word Juggler* each send single bytes, and the same is probably true for all the others. This, of course, is terribly inefficient; but remember that a word processor thinks it is dealing with a printer, and no inefficiency in the computer will ever be as slow as a printer.

You may also want your driver to be able to handle multibyte write requests should they occur. Such multibyte requests are issued by the Pascal Editor and by the transfer command in the Pascal Filer. Since each separate SOS call requires an overhead of about 150 microseconds, handling a number of output bytes in each DWrite call is quite a lot faster. It is barely conceivable that the writer of some future word processor might realize this, but don't hold your breath.

Meanwhile, since there is no obvious way to speed up the word processor itself, the amount of waiting time you will actually eliminate by using a spooler depends largely on how rapidly your word processor generates its output stream. If the word processor is just managing to keep ahead of your printer there will be no idle time to save. But not to worry. It isn't easy to run as slowly as a printer.

In any event, the word processor's output stream will arrive at SpoolSave as a series of DWrite requests. The driver, in turn, must pass on this data to the disk file, a step that again requires a SOS call. The most straightforward technique is for SpoolSave to store the data in a local memory location and queue up another event. It will then be easy for the event handler, working in the user environment, to transfer that data to the disk driver with a DWrite SOS call.

This procedure does work, but it will probably mean that the computer will end up processing an event and a second SOS call for every byte in the output stream. This will only compound the inefficiency of the word processor. You, on the other hand, want SpoolSave to handle the printer-ready text as rapidly as possible. The whole business will be futile if storing the file on disk takes longer than it would have taken to print the text in the first place. The solution is to save up a bunch of data bytes in a fairly large local buffer and send the whole buffer to disk all at once.

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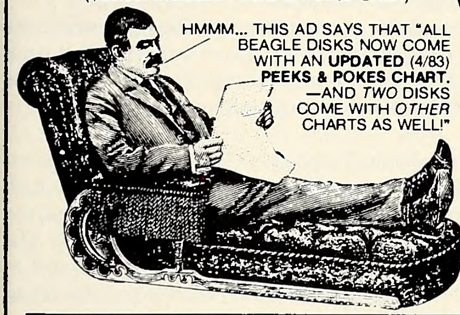

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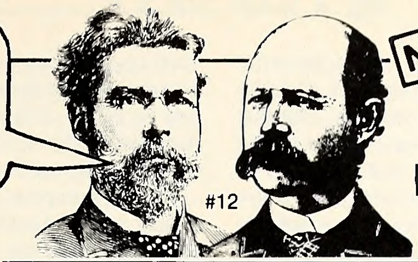

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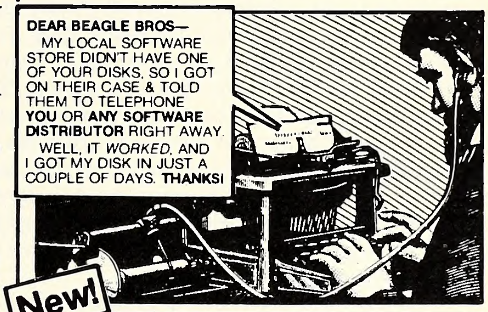

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In theory SpoolSave's buffer could be large enough to hold the entire text. In that case you wouldn't even need a temporary disk file; the spooler could print directly from your I/O buffer in memory. But that would tie up vast amounts of memory that could never be used by the word processor. The best compromise is a modest buffer that holds an integral number of blocks. Disk drivers always read and write entire blocks, so maximum efficiency is achieved if you save up some multiple of 512 bytes. We have elected to use two blocks, or 1,024 bytes. A buffer that size uses little memory and requires only one disk access for every 1,000-plus characters of text.

If SpoolSave does receive just one byte at a time, the procedure is straightforward. The DWrite code in SpoolSave transfers the incoming data byte from the word processor's source buffer to the next free byte in its own local buffer. Then, if the local buffer is full, it queues up another event; otherwise it just exits back to the word processor. When the event handler is called it dumps the full buffer to the temporary disk file and resets the buffer pointers. Then the process begins again.

It's a bit more complicated for multibyte requests. SpoolSave must always accept all the bytes presented to it. It cannot, for example, handle some of the data, exit the driver to enter an event handler, dump the buffer, and then somehow return to SpoolSave to finish processing the request. There is no legal way back. So you really have to know the maximum number of bytes that will ever be requested and make sure that at least that much room is always available in your buffer.

If the word processor, or some other source program, is capable of sending a very large number of bytes all at once, then you've got a problem. The transfer command in the Pascal Filer, for example, may send many thousands of bytes in a single request. There's no way you could handle this with a local buffer. But all is not lost. You simply let the disk driver make the transfer. Your driver makes a local record of the pointers to the source buffer and the number of bytes to be transferred and then queues an event. The event handler, in turn, uses those same parameters in its own DWrite SOS call to the disk driver. It's very slick for large multibyte requests, but for single-byte requests from word processors it is considerably more efficient to save up a bunch of output bytes in your own local buffer.

When the word processor is finished printing your text, or so it thinks, it will send a DClose SOS call to SpoolSave. The driver should then mark itself closed and queue up yet another event. This time the event handler must dump any remaining data in the local buffer onto disk and close the storage file.

At this point SpoolSave's job is done. We could, in fact, immediately start up the spooler and begin to print the text. But it is more flexible to have a separate trigger for the actual printing. This will make it easier to print multiple copies and also will allow you to do the printing at a later time, perhaps after you have booted up an entirely different disk.

Firing Up the Spooler. Actual printing is done by the spooler proper, which we shall refer to as SpoolPrint. By coding this part as a separate module it will be handled by SOS as a completely separate driver. That will permit any command in any language to trigger the spooler, as long as it is capable of opening the driver. In a word processor, for example, you could place a very short text of approximately zero length in the editor and instruct the word processor to print it to SpoolPrint. The word processor will issue a DOpen call to SpoolPrint and the driver can take it from there. In other languages you can use any open, save, store, copy, or transfer command.

Don't forget that the word processor will be most unhappy if it cannot complete the entire process of printing the text (it won't take long). So in addition to its principal job, SpoolPrint should also provide some dummy code to field DWrite and DClose SOS calls. A simple return will do.

SpoolPrint's first task is to open the disk file containing the text to be printed. That, of course, requires a SOS call and must be done from the user environment. So we need another event. You may, in the same event, wish to input the appropriate file name from the keyboard as we have done in the accompanying driver. SOS calls make it easy.

Conceptually the main spooling cycle is straightforward. The Qume printer's internal buffer has been filled and the printer is madly pounding away. You are also madly pounding away on the keyboard. The Apple III, in fact, is so enthralled by what you are typing that it has completely forgotten about the printer. Suddenly an interrupt occurs. The printer has announced that it needs more data. The interrupt driver in SpoolPrint quickly transfers a few more bytes from its own buffer (the same one used by SpoolSave) and, almost immediately, is gone. Once in a while, however, when SpoolPrint's own buffer is empty, the interrupt handler sets an event. This event handler, of course, reads more data from the disk and refills SpoolPrint's transfer buffer. Then all continues as before. At least that's the theory. The implementation is another matter.

Up to this point, whenever we've wanted to use SOS calls we've simply switched to the user environment by queuing an event. The driver exits, SOS transfers control to the event, and we continue right on in the event handler. The reason this works is that when we exit a driver SOS normally expects to return us directly to the user environment. That is, when we leave the driver we are on our way back to the word processor or Pascal or whatever the main program happens to be. Along the way, SOS processes our event.

The sticky point for spoolers is that SOS checks the event queue *only* when returning to the user environment. We are able to transfer to the user environment of an event handler only because we are headed back to the main program when we exit a driver. Events work very nicely for drivers, but not so for interrupt handlers; the spooler runs primarily in an interrupt handler.

Exiting an interrupt handler may or may not mean that you are headed back to the main program and therefore to the user environment. Usually it does not. If an interrupt occurs while one of the drivers is running, SOS will return control to that driver when the interrupt handler exits. The interrupt handler may have queued an event, but the event will *not* be processed, at least not then. Control will go straight back to the driver that was interrupted, and only when that driver has finished and control is actually on its way back to the main program will SOS check the event queue and process the event.

Interrupts, by their very nature, occur randomly. The place where the computer spends most of its time determines the environment that most often will be interrupted. And where does the computer spend most of its time? About 99 percent of the time it is waiting for you to enter the next keypress.

This is a real problem for Apple III spoolers. The spooler is supposed to work in the background while you are busy creating deathless prose on the word processor. So the computer will actually be waiting for you, for your next perfect sentence. But it waits within the console driver. The word processor requests each keypress by issuing a DRead SOS call to the console driver, and the console driver waits while you think about what to say. Our word processor, we are sure, has the patience of Job.

The effect is unpleasant. The spooler does work, after a fashion, but each time SpoolPrint's buffer is empty the printer stops. The interrupt handler queues an event, but nothing happens. Then, in the silence of creative ecstasy you begin to type. Wham! The printer starts off again, and out goes your thought and your Nobel Prize in literature. It's very depressing.

There are a variety of solutions—none, so far as we know, entirely legal. The conventional approach (*not* the approach used in the accompanying driver) is to work on the console driver. The console, after all, is where the hang-up usually takes place. Somehow you've got to break up the console driver's wait loop, at least momentarily, so that SOS will process SpoolPrint's event. The trick is to make the console driver itself set an event and exit, instead of waiting around in a loop. The console's event handler then turns right around and issues a DRead SOS call back to the console driver again. It is really issuing the call to itself, but SOS doesn't know that. Strictly speaking the process is not reentrant. The console driver simply cycles back and forth between the console's DRead code and an event handler. Since all events are handled first-come, first-serve (assuming they are assigned the same priority), any other events that may have been queued will be processed between cycles.

In practice it's a bit tricky. First you take your handy copy of the console driver source code (hah!) and locate the wait loop. You will find it in a subroutine called by DRead. You must change this code so that whenever a requested keypress is not available the driver sets an event and exits. The event handler, in turn, issues a DRead call and soon you are back again at DRead in the console driver. This secondary call must, of course, be distinguished from the original call, but that is easily accomplished by a semaphore flag from the event handler.

In order to issue a DRead call the event handler must somehow obtain a valid file reference number. The easiest method is for the event handler to maintain its own separate access path to the console with its own file

reference number. On rare occasions, however, this may not be possible. A private access path to the console will require SOS to find room for the associated I/O buffer it maintains for each file. Some application programs may already have reserved each byte of free memory in the machine, in which case your event's open call to the console will fail. If you are really worried about this you can obtain instead the original program's file reference number by finding your way back to the original code and looking in the caller's parameter list. You will need the caller's bank number and program counter from the stack (see table 1). Remember that the program counter is stored as a bank-switched address that must be converted for extended addressing.

0D	— previous data—
0C	old program counter H
0B	old program counter L
0A	6502 status
09	A register
08	X register
07	Y register
06	environment register
05	zero page register
04	bank register
03	caller's event fence
02	IPL return address H
01	IPL return address L
SP	— undefined —

Table 1. User's stack on entering an event handler.

A third possibility for returning to the console driver involves use of your own special duty DControl call. These calls require only the console device number, which is easily obtainable; you won't need a file reference number at all. We are less certain, however, that we can fully restore the former conditions in the console driver if we have reentered with a device call. But it will probably work.

Once you are back in the console driver's DRead code you should find out if a keypress has become available. It will be in the typeahead buffer. If the typeahead buffer is still empty, you just set a semaphore flag and exit. You will then, of course, be returned to the event handler just beyond the SOS call. The semaphore flag tells the event handler to loop back and try the DRead call again.

On the other hand, if the typeahead buffer is not empty, you know that someone has punched the keyboard. Now you want to restore everything to the state it was in before you began all this. Naturally everything you restore will previously have to have been saved. We used the brute force approach and saved the following: the local subroutine return address and all the 6502 registers; the SOS call parameters and everything else on zero page between $C0 and $FF; the corresponding xbytes $14C0..$14FF; all the console driver status parameters totaling $C9 bytes beginning at byte $61 of the driver; and a data byte that DRead has already placed on the stack. If the overflow flag (bit 6) of the 6502 status register is set, then there are two data bytes on the stack.

After all this is restored you may jump back to the original wait point. The console driver will go on about its business as though you had never been messing around (we hope). Once the read request is satisfied, however, the driver will exit back to the event handler, not to the original calling program. This is okay; the original return address is now the return address of the event. But before exiting, the event handler must store the last DRead SOS call error code, returned in the A register, into the ninth byte down on the stack. This will later be restored as the caller's A register (see table 1).

This scheme actually works. It was amazingly difficult to debug, for reasons that remain obscure. The method does take frightful liberties with the SOS abstract machine, but the only thing that's actually illegal is knowledge of the stack usage detailed in table 1. Theoretically Apple may decide some day to use a different arrangement of information on the stack, but it seems unlikely.

The real problem is that you need a copy of the console driver source code. You may be able to get one from Apple. We made a reconstruction—but that's another story. And even if you do have the source code, this scheme means that your spooler is chained forever to a particular version of the console driver, and an unauthorized version at that. So if you're going to be illegal about it, why not go just a bit further and get yourself a standalone spooler that will work with any console driver?

Wicked Ways! There's no doubt about it. The accompanying driver is definitely illegal. It may also crash the system in some unusual circumstance that has yet to be encountered. In our admittedly limited testing, however, it worked very well.

The difficulty with setting events from an interrupt handler is that the event may not be processed for a long time, if ever. But the only purpose in setting an event in the first place is just to get into the user environment. We want to be able to issue SOS calls. In the accompanying driver the interrupt handler doesn't set events. We simply change the environment. Later, after making the necessary SOS calls, we switch back to the interrupt handler environment again. It's a real no-no. But we can get away with it if we can prevent SOS from suspecting what we're doing. It involves a lot of saving and restoring.

The reason drivers are not allowed to issue SOS calls is that SOS is not designed to be reentrant. Each SOS call, for instance, reinitializes the 6502 stack, the private stack used by SOS. Anything already on the stack would be lost. SOS calls also use specific registers on the SOS zero page for interfacing with drivers, and these would be overwritten in a reentrant SOS call. The same difficulty exists for interrupt handlers. More often than not an interrupt handler will interrupt one of the drivers (and therefore a SOS call in progress). So any SOS calls issued by an interrupt handler would almost certainly be reentrant as well.

There are many other problems. SOS keeps track of open files. Suppose the reentrant SOS call were to close a file that is still the subject of another uncompleted SOS call. How about moving file marks around, or overwriting partial data already present in the I/O buffers? The bottom line is that only code running in the user environment may issue SOS calls, and every SOS call must be thoroughly complete before control may be returned to the user environment.

So if we are to succeed with illegal environment twiddling, we must be careful to restore everything that might be overwritten and to overwrite as little as possible. We will be making a very limited intrusion on territory owned by SOS—more of a raid than an invasion. If you actually know how to make SOS truly reentrant, with recursive SOS calls in depth, call collect!

The accompanying driver illustrates the method. Our interrupt han-

dler wants to refill the transfer buffer by making a DRead SOS call to the disk file. We transform the system to the user environment and issue the SOS call. Then we restore everything and go back to being an interrupt handler again. As far as we can tell, things go on as before.

One of the bugs that were encountered illustrates the pitfalls. At one point the spooler was skipping some text now and then. The skip occurred at apparently random locations in the text but was always $0400 bytes in length. That happens to be the size of the transfer buffer. It turns out, we think, that SOS was having trouble keeping track of the file mark. Apparently the act of restoring the interrupt environment was erasing or distorting SOS's record of our position within the file. Now that isn't so mysterious. What is still something of a mystery is why it should happen intermittently. We are meddling in a very complicated system without a road map. But fortunately that particular problem could be solved by maintaining our own position record and resetting the file mark accordingly.

We have followed our traditional approach—brute force. 6502 interrupts are already disabled, since we start out in an interrupt handler. We save the following: SOS's stack pointer and all the active bytes in SOS's stack; the entire user stack page ($1Bxx); the environment, zero page, and bank registers; the interval $C0..$FF on SOS's zero page ($18xx) and the corresponding xbytes $14C0..$14FF. Next we establish the standard user environment by storing $38 in the environment register and $1A in the zero-page register. Finally we reinitialize the user stack and enable 6502 interrupts. Restoration, of course, proceeds in reverse order.

If you ever use this method in another application you may want to put all the switching code in a subroutine. But don't forget that the environment switch will also change stack page. Your subroutine return address will vanish in the mist. You may, however, jump back and forth by building the return jump instruction "on the fly."

The accompanying driver takes one other precaution. We avoid any hanky-panky while the main program is trying to access a floppy disk. The floppy disk drivers have a common I/O buffer on page $02, and it wouldn't do to have two floppy access calls fighting over the same space. It so happens that the floppy disk drivers run with ROM enabled, so the interrupt handler can use this fact to tell if a conflict is about to occur. The value of the environment that was interrupted will be found in the sixth byte down on SOS's stack (see tables 2 and 3).

Some SOS calls seem to be more dangerous than others in an artificial user environment. Calls to character devices, for example, should be safer than calls to block devices, since SOS keeps fewer records about character devices, mainly just the access path to get there. Similarly, read calls to disk files seem much safer than write calls. The only permanent damage you can ever do to your system is to destroy the dictionary structure of a disk by writing stuff in the wrong place. It's a real disaster on the ProFile, so back everything up. In theory you could even mess up SOS in such a way that it would *later* wreck your disk. This is unlikely, but Lloyd's of London won't cover you if it does.

Be particularly wary of overlapping file calls that use the same I/O buffer in SOS. This would occur, for example, when an access call to a particular file reference number is interrupted, and the interrupt handler then makes an illicit call to the same file reference number. In this connection there is cause for concern, as noted earlier, about all overlapping calls to the floppy drivers. They do share a common pathway through a buffer on page $02 of the lower system memory bank. It's an evolutionary relic from Apple II, like an appendix.

This particular concern may, however, be unwarranted. Presumably, each open floppy disk file also has its own separate I/O buffer somewhere in memory, as do all open files maintained by SOS. The common pathway area on page $02 may be protected. It may be that this area is saved, or at least reloaded after every interrupt. Certainly the presence of repeated interrupts during floppy disk access will greatly prolong access time, as you will notice while using the spooler. Loading or saving a file may take twice or three times as long as it usually does.

You may demonstrate this effect with a different interrupt source by holding down control-keypad 5 and the closed apple key while loading or saving a file. This combination generates an endless rapid sequence of keyboard interrupts and is a handy tool for testing the emotional stability of interrupt-controlled drivers. Notice that the prolongation effect does not seem to occur when using the ProFile.

You may wish to use these illegal methods in other applications. We wish you luck. If you have problems you might try saving and restoring more stuff, such as the rest of SOS's zero page or the areas on page $19 that SOS uses for temporaries. We have only one request, should you do this: Don't tell Apple that we suggested it.

	User's Stack		SOS's Stack
07	— previous data —	01FF	user stack pointer
06	old program counter H	01FE	environment register
05	old program counter L	01FD	zero-page register
04	6502 status	01FC	bank register
03	A register	01FB	I/O expansion slot
02	X register	01FA	IPL return address H
01	Y register	01F9	IPL return address L
SP	— undefined —	01F8	— undefined —

Table 2. The stacks during a first-level interrupt.

0D	— previous data —
0C	old program counter H
0B	old program counter L
0A	6502 status
09	A register
08	X register
07	Y register
06	environment register
05	zero-page register
04	bank register
03	I/O expansion slot
02	IPL return address H
01	IPL return address L
SP	— undefined —

Table 3. SOS's stack during a second-level interrupt.

```
;                         SPOOLER DRIVER
;
; Modules: SpoolSave and SpoolPrint
;
; CAUTION: BACK UP EVERYTHING BEFORE USING!
;          Not supported by Apple III/SOS Abstract Machine.
;
; SOS Equates
; 402
AllocSIR     .equ    1913       ; allocate system internal
                                  resource
DealcSIR     .equ    1916       ; deallocate system internal
                                  resource
SysErr       .equ    1928       ; report error to system
QueEvent     .equ    191F       ; queue an event
Ereg         .equ    0FFDF      ; environment register
Breg         .equ    0FFEF      ; bank register
Zreg         .equ    0FFD0      ; zero page register
zpg          .equ    0D0        ; driver free area on SOS
                                  zero page
beacon       .equ    0777       ; that which flashes
;
ACIADR       .equ    0C0F0      ; ACIA Data Register
ACIASR       .equ    0C0F1      ; ACIA Status Register
ACIAMR       .equ    0C0F2      ; ACIA Command Mode
                                  Register
ACIACR       .equ    0C0F3      ; ACIA Control Register
;
ReqCode      .equ    0C0        ; request code
SOSunit      .equ    0C1        ; unit number
SOSbuf       .equ    0C2        ; buffer pointer
ReqCnt       .equ    0C4        ; requested byte count
CtlStat      .equ    0C2        ; control/status code
;
; SOS Error Codes
;
XReqCode     .equ    20         ; invalid request code
XCtlCode     .equ    21         ; invalid control/status code
XNotOpen     .equ    23         ; device not open
XNotAvail    .equ    24         ; device not available
XNoResrc     .equ    25         ; resource not available
XBadOp       .equ    26         ; invalid operation
;
```

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- **PRINT SERIAL!**
- **PROCESS/COMPUTE/ENTER DATA!**

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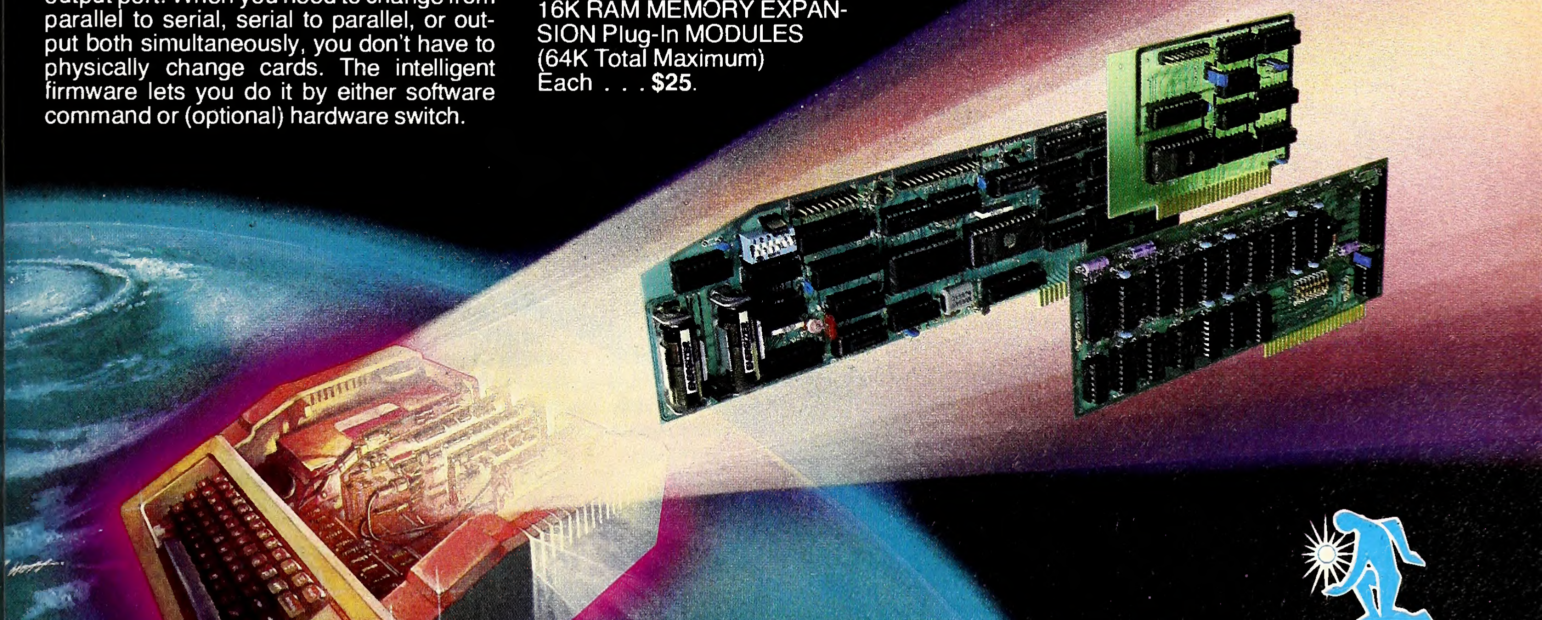

PROMETHEUS

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```
; SOS call numbers
;
CREATE      .equ    0C0
OPEN        .equ    0C8
READ        .equ    0CA
WRITE       .equ    0CB
CLOSE       .equ    0CC
SETMARK     .equ    0CE
GETMARK     .equ    0CF
SETLEVEL    .equ    0D2
GETLEVEL    .equ    0D3
DDSTATUS    .equ    82
DDCONTROL   .equ    83
GETDEVNUM   .equ    84
;
; macros
;
            .macro  moveB           ; move byte
            lda     %1
            sta     %2
            .endm
;
            .macro  moveW           ; move word
            lda     %1
            sta     %2
            lda     %1+1
            sta     %2+1
            .endm
;
            .macro  incW            ; increment 2-byte pointer
            inc     %1
            bne     $1
            inc     %1+1
$1          .endm
;
            .macro  SOS             ; execute SOS call
            brk
            .byte   %1
            .word   %2
            .endm
;
            .macro  switch
            lda     %1              ; load A with switch index
            cmp     #%2+1           ; do bounds check
            bcs     $1
            asl     A               ; double for word length
            tay
            lda     %3+1,y          ; get switch index from table
            pha                     ; push on stack-high byte
                                      first
            lda     %3,y
            pha
            rts                     ; go to code
$1          .endm
;
            .macro  set1mhz         ; clock speed 1 MHz
            lda     Ereg
            ora     #80
            sta     Ereg
            .endm
;
            .macro  xonACIA         ; enable ACIA transmitter
            lda     ACIAMR          ;       interrupts
            and     #0E0
            ora     #07
            sta     ACIAMR
            .endm
;
            .macro  xoffACIA        ; disable ACIA transmitter
            LDA     ACIAMR          ;       interrupts
            AND     #0E0
            ORA     #0B
            STA     ACIAMR
            .endm
;
            .proc   SPOOLER
;
; 1st Device Identification Block (DIB)
;
```

```
DIB         .word   DIB2            ; link-to 2nd module
            .word   Entry           ; entry point
SpoolSave   .byte   0A              ; name count
            .ascii  ".SPOOLSAVE      "  ; (string length 15 chars)
            .byte   80              ; active, no page alignment
            .byte   00              ; slot number
            .byte   00              ; unit number-1st module
            .byte   41              ; type
            .byte   01              ; subtype
            .byte   00              ; filler
            .word   0000            ; # blocks-none
            .word   0000            ; manufacturer ID
            .word   1000            ; release number
;
; DCB length and DCB
;
DCB         .word   0000
;
; 2nd Device Identification Block (DIB2)
;
DIB2        .word   0000            ; link
            .word   Entry           ; entry point
SpoolPrint  .byte   0B              ; name count
            .ascii  ".SPOOLPRINT     "  ; (string length 15 chars)
            .byte   80              ; active, no page alignment
            .byte   00              ; slot number
            .byte   01              ; unit number-2nd module
            .byte   41              ; type
            .byte   01              ; subtype
            .byte   00              ; filler
            .word   0000            ; # blocks-none
            .word   0000            ; manufacturer ID
            .word   1000            ; release number
;
; DCB length and DCB
;
DCB2        .word   0005            ; bytes in configuration block
;
BaudRateCode .byte  08              ; baud rate code
DataFmtCode .byte   22              ; data format code
CRdelay     .byte   00              ; delay after carriage return
LFdelay     .byte   00              ; delay after line feed
FFdelay     .byte   00              ; delay after form feed
;
; Local storage
;
pSpoolPrint .word   SpoolPrint      ; pointer to name string
XfrBuf      .block  200             ; 0400 byte transfer buffer
            .block  200
pXfrBuf     .word   XfrBuf          ; pointer to transfer buffer
limit       .word   XfrBuf+0400     ; comparison value
BufMark     .word   0000            ; current position in buffer
count       .word   0000            ; counter
;
conbuf      .block  30,0            ; console input buffer
conbufLen   .word   *-conbuf        ; length of console input
                                      buffer
pconbuf     .word   conbuf          ; pointer to console input
                                      buffer
p1conbuf    .word   conbuf+1        ; pointer to next byte
;
sOPENFLG    .byte   00              ; SpoolSave open flag
pOPENFLG    .byte   00              ; SpoolPrint open flag
DelayBytes  .byte   00              ; number of cycles to wait
saveSource  .block  03,00           ; saves a 3-byte pointer
saveZpg     .block  03,00           ; ditto
pZpg        .word   zpg             ; a pointer to zero page
security    .byte   00              ; security flag for DControl
                                      calls
notNow      .byte   00              ; flag during illegal operations
errorcode   .byte   00              ; a temporary
flasher     .byte   00              ; a counter
;
; parameter lists for SOS calls-and some storage bytes, etc.
;
conprm      .block  08,00           ; for console access calls
filprm      .block  08,00           ; for file access calls
pfilprm6    .word   filprm+6        ; a pointer
mgetprm     .byte   02              ; for get file mark calls
            .block  05,00
```

```
msetprm     .byte   03              ; for set file mark calls
            .block  06,00
param       .block  08,00           ; for other SOS calls
;
conref      .byte   00              ; for console reference
                                      number
conDevnum   .byte   00              ; for console device number
prtDevnum   .byte   00              ; for SpoolPrint device
                                      number
;
pconsole    .word   conname
conname     .byte   08              ; name string
            .ascii  ".CONSOLE"
;
pStatList   .word   conStatus       ; pointer
conStatus   .block  60,00           ; for console status storage
pCtrlList   .word   CtrlList        ; pointer
CtrlList    .byte   80,0D           ; (newline ON, newline char
                                      = CR)
;
; messages for writing to console
;
pmess1      .word   mess1
mess1       .byte   1A,00,15,1D,0A
            .ascii  "Pathname for Temporary Storage: "
mess1Len    .word   *-mess1
;
pmess2      .word   mess2
mess2       .byte   1A,00,15,1D,0A
            .ascii  "Ready to print- SPACE  to start - A  to abort "
mess2Len    .word   *-mess2
;
pmess3      .word   mess3
mess3       .byte   1A,00,15,1D,0A
            .ascii  "Pathname to Print: "
mess3Len    .word   *-mess3
;
pmess4      .word   mess4
mess4       .byte   1A,00,15,1D,0A
            .ascii  "Error creating or accessing file...any key to
                       continue: "
mess4Len    .word   *-mess4
;
pmess5      .word   mess5           ; beeps speaker
mess5       .byte   07
mess5Len    .word   *-mess5
;
; buffers for saving current system during environment switch
;
buf0100     .block  100,00          ; for SOS stack
buf1B00     .block  100,00          ; for user stack
buf1800     .block  40,00           ; for SOS zero page
buf1400     .block  40,00           ; for SOS zero page xbytes
saveX       .byte   00              ; for X register
saveLevel   .byte   00              ; for system file level
;
; event parameter list
;
pEvt        .word   Evt             ; pointer to event parameter
                                      list
Evt         .byte   0FF             ; priority
            .byte   00              ; ID-we won't use this one
            .word   EHandler        ; event handler addr L,H
EHBank      .byte   00              ; event handler addr bank
EvtNumber   .byte   00              ; our temporary-used as
                                      parameter
;
; SIR table parameter list
;
SIRaddr     .word   SIRtable        ; pointer to SIR table
SIRtable    .byte   01              ; SIR #1-ACIA
            .byte   00              : Sir ID assigned by SOS
            .word   IHandler        ; interrupt handler addr L,H
IHBank      .byte   00              ; interrupt handler addr bank
;
; ************** Main entry point for the driver **************
;
Entry       switch  ReqCode,8,DoTable
;
BadReq      lda     #XReqCode
```

```
            jsr     SysErr
NotOpen     lda     #XNotOpen
            jsr     SysErr
;
; Dispatch table
;
DoTable     .word   DRead-1         ; 0 read
            .word   DWrite-1        ; 1 write
            .word   DStatus-1       ; 2 status
            .word   DControl-1      ; 3 control
            .word   BadReq-1        ; 4 unused
            .word   BadReq-1        ; 5 unused
            .word   DOpen-1         ; 6 open
            .word   DClose-1        ; 7 close
            .word   DInit-1         ; 8 init
;
; ************** DInit call processing **************
;
DInit       lda     SOSunit         ; which module
            bne     $1              ; just do all this once
            lda     #00
            sta     pOPENFLG
            sta     sOPENFLG
            lda     Breg            ; our present bank number
            and     #0F
            sta     EHBank          ; bank number of event
                                      handler
            sta     IHBank          ; bank number of interrupt
                                      handler
;
; validate baud rate and data format codes
;
            lda     BaudRateCode
            and     #0F
            sta     BaudRateCode
            tax
            lda     DataFmtCode
            and     #0EE
            ora     #10
            cpx     #03
```

```
            bne     $2
            ora     #80
$2          sta     DataFmtCode
$1          clc
            rts
;
; *************** DOpen call processing ***************
;
DOpen       lda     pOPENFLG
            ora     sOPENFLG
            beq     $1                  ; b/ neither open
            lda     #XNotAvail
            jsr     SysErr
;
$1          moveW   pXfrBuf,BufMark     ; initialize transfer buffer
                                          pointer
            lda     SOSunit             ; use modular unit number
                                          (0 or 1)
doEvent     sta     EvtNumber           ; A reg = index to Event List
            ldx     pEvt                ; event handler addr H
            ldy     pEvt+1              ; event handler addr L
            jsr     QueEvent
            rts
;
; *************** DRead call processing ***************
;
DRead       lda     sOPENFLG
            ora     sOPENFLG
            bmi     $1                  ; error either way
            jmp     NotOpen
$1          lda     #XBadOp
            jsr     SysErr
;
; *************** DWrite call processing ***************
;
DWrite      lda     SOSunit             ; which module
            bne     $1                  ; b/ SpoolPrint
            bit     sOPENFLG            ; is SpoolSave open
            bmi     $2                  ; b/ yes
            lda     #XNotOpen           ; else report error
            jsr     SysErr
$1          rts                         ; if SpoolPrint then just return
;
; is this single byte or multibyte request
;
$2          lda     #01
            cmp     ReqCnt
            bne     multi
            lda     #00
            cmp     ReqCnt+1            ; high byte should be zero
            bne     multi
;
; single bytes get stored in local buffer
;
            lda     #00                 ; make 3-byte pointer to
                                          transfer
            sta     zpg+1401            ;   buffer (in zero page free
                                          area)
            moveW   BufMark,zpg         ; contains current buffer
                                          position
;
            ldy     #00                 ; init Y to zero
            lda     @SOSbuf,y           ; one byte from user
            sta     @zpg,y              ;   to transfer buffer
            incW    BufMark             ; increment buffer position
;
; blink beacon after each 256 characters transferred
; alternate inverse/normal for character near lower right corner
; keeps operator from concluding that machine is in never-never land
;
            inc     flasher             ; a counter
            bne     $3
            lda     beacon              ; a site in screen memory
            eor     #80                 ; alternate inverse/normal
            sta     beacon
;
; if buffer full then set event to dump it-else just exit
;
$3          lda     BufMark+1           ; compare pointer to limit
            cmp     limit+1
            bcc     $4
            lda     BufMark
            cmp     limit
            bcs     $5
$4          rts                         ; exit if not full
$5          lda     #02                 ; if full queue event #2
            jmp     doEvent
;
; handle multibyte write requests
;     first save 3-byte address of source buffer
;
multi       moveW   SOSbuf,saveSource
            moveB   SOSbuf+1401,saveSource+2
;
; put request count in our parameter list-queue event #3
;
            moveW   ReqCnt,filprm+4
            lda     #03
            jmp     doEvent
;
; *************** DClose call processing ***************
;
DClose      lda     SOSunit             ; which module
            bne     $1                  ; b/ SpoolPrint
            asl     sOPENFLG            ; is SpoolSave open-closes it
            bcs     $2                  ; b/ yes
            jmp     NotOpen
$1          rts                         ; not allowed to close
                                          SpoolPrint
;
; SpoolSave close handled by Event #4
;
$2          lda     #04
            jmp     doEvent
;
; *************** DStatus call processing ***************
; these do nothing except preserve the standard driver form
;
DStatus     lda     pOPENFLG
            ora     sOPENFLG
            bmi     $1                  ; b/ open
            jmp     NotOpen
$1          rts                         ; don't do anything
;
; *************** DControl call processing ***************
;       only our own events can legally use these calls
;
DControl    .equ    *
            asl     security            ; checks and clears security
                                          flag
            bcs     $1                  ; b/ ok-it's our event calling
            rts                         ; all other calls
;
$1          switch  ctlStat,2,CtrlTable
;
            lda     #XCtlCode           ; bad code
            jsr     SysErr
;
CtrlTable   .word   DC00-1              ; open RS232 port to printer
            .word   DC01-1              ; commence spooling
            .word   DC02-1              ; close RS232 port to printer
;
DC00        lda     #05                 ; allocate SIR #1-ACIA
            ldx     SIRaddr
            ldy     SIRaddr+1
            jsr     AllocSIR
            bcc     $1                  ; b/ allocation ok
            lda     #XNoResrc           ; else report error
            jsr     SysErr
$1          set1mhz                     ; slow clock
            php                         ; disable 6502 interrupts
            sei
            sta     ACIASR              ; reset ACIA (dummy write)
            lda     DataFmtCode
            and     #0F0
            ora     BaudRateCode
            sta     ACIACR              ; init DataFormat and Baud
                                          Rate
            lda     DataFmtCode
            asl     A
```

```
              asl     A
              asl     A
              asl     A
              ora     #0B
              sta     ACIAMR
              plp                       ; restore interrupt status
;
; fall into next code and commence spooling
;
DC01          php                       ; disable 6502 interrupts
              sei
              set1mhz                   ; slow clock
              lda     #0FF              ; initialize counter := FFFF
                                          (-1)
              sta     count
              sta     count+1
;
; load registers required by interrupt handler
;
              ldx     #zpg              ; X=offset to driver free area
              ldy     ACIASR            ; Y=ACIA status
              jsr     IHandler          ; call interrupt handler as
                                          subroutine
              plp                       ; restore 6502 interrupt status
              rts
;
; Note: Only our event is allowed to close SpoolPrint
;
DC02          asl     pOPENFLG          ; closes SpoolPrint
              lda     Ereg              ; set 1 MHz
              tax
              ora     #80
              sta     Ereg
              sta     ACIASR            ; reset ACIA
              stx     Ereg              ; restore 2 MHz
              lda     #05               ; deallocate SIR #1-ACIA
              ldx     SIRaddr
              ldy     SIRaddr+1
              jsr     DealcSIR
              rts
;
; *************** Event handlers ***************
;
EHandler      .equ    *
              switch EvtNumber,6,EvtList
;
; Dispatch table for events
;
EvtList       .word   Evt0-1            ; open temporary disk file
              .word   Evt1-1            ; initiate spooler
              .word   Evt2-1            ; dump buffer to disk
              .word   Evt3-1            ; multibyte write request
              .word   Evt4-1            ; close disk file
              .word   Evt5-1            ; restart when safe
              .word   Evt6-1            ; close spooler
;
; *************** Event 0 processing ***************
;          create and open temporary disk file
;
; save current system level and set level = 1 (to frustrate Pascal)
;
Evt0          jsr     LevelOne
              jsr     newconsole        ; change console status
;
; display mess1-"Pathname for Temporary Storage: "
;
saver         lda     #03               ; parameter count
              sta     conprm
              moveW   pmess1,conprm+2   ; message address
              moveW   mess1Len,conprm+4 ; message length
              SOS     WRITE,conprm
;
; input pathname
;
              jsr     instring          ; get a string
              bcc     $1                ; b/ string length not zero
              jmp     out1              ; if length zero then just quit
;
; create file
;
$1            lda     #03               ; parameter count
              sta     filprm
              moveW   pconbuf,filprm+1  ; console input buffer (has
                                          name)
              moveW   pfilprm6,filprm+3 ; pointer to optional list
              lda     #01
              sta     filprm+5          ; length of optional list
              lda     #06               ; file type := "general
                                          binary"
              sta     filprm+6
              SOS     CREATE,filprm
              beq     $2                ; b/ no error
              jsr     filerror          ; send error message
              jmp     saver             ; try again
;
; open disk file (at level 1)
;
$2            lda     #04               ; parameter count
              sta     filprm
              lda     #00               ; no optional list desired
              sta     filprm+6
              SOS     OPEN,filprm
;
; prepare for WRITE-(buffer and count supplied later)
;
              lda     #03               ; parameter count
              sta     filprm
              moveB   filprm+3,filprm+1 ; file reference number
;
; mark SpoolSave open and leave
;
              lda     #80
              sta     sOPENFLG
out1          jsr     restoreCon        ; restore console status
              jsr     oldLevel          ; restore former system level
              rts
;
; *************** Event 1 processing ***************
;                 initiate spooler
;
```

```
Evt1        jsr     LevelOne             ; system file level - >1
            jsr     newconsole           ; change console status
;
; display mess3-"Pathname to Print: "
;
printer     .equ    *
            lda     #03                  ; parameter count
            sta     conprm
            moveW   pmess3,conprm+2      ; message address
            moveW   mess3Len,conprm+4    ; message length
            SOS     WRITE,conprm
;
; input pathname
;
            jsr     instring             ; get a string
            bcc     $1                   ; b/ string length not zero
            jmp     out1                 ; if length zero then just quit
;
; open disk file (at level 1)
;
$1          lda     #04                  ; parameter count
            sta     filprm
            moveW   pconbuf,filprm+1     ; console buffer contains
                                         name
            lda     #00
            sta     filprm+6             ; no option list desired
            SOS     OPEN,filprm
            beq     $2                   ; b/ no error
            jsr     filerror             ; send error message
            jmp     printer              ; try again
;
; prepare for reading
;
$2          lda     #04                  ; parameter count
            sta     filprm
            moveB   filprm+3,filprm+1    ; file reference number
            moveW   pXfrBuf,filprm+2     ; address of transfer buffer
            lda     #00                  ; request 0400 bytes
            sta     filprm+4
            lda     #04
            sta     filprm+5
;
; display mess2-"Ready to print- SPACE  to start- A  to abort "
;
readyprt    .equ    *
            lda     #03                  ; parameter count
            sta     conprm
            moveW   pmess2,conprm+2      ; message address
            moveW   mess2Len,conprm+4    ; message length
            SOS     WRITE,conprm
;
; input one keypress
; If A then close and leave
; if not SPACE then request another byte
;
            jsr     input1               ; get keypress
            cmp     #" "                 ; ASCII SPACE
            beq     $1
            and     #0DF                 ; to upper case
            cmp     #"A"
            bne     $2
;
; if abort then need to close file and quit
;
            jsr     closefile
            jmp     out1                 ; common exit path
;
; else get another keypress
;
$2          jsr     bell                 ; beeps speaker
            jmp     readyprt             ; try again
;
; get device number of SpoolPrint driver
;
$1          lda     #02                  ; parameter count
            sta     param
            moveW   pSpoolPrint,param+1  ; pointer to name string
            SOS     GETDEVNUM,param
            moveB   param+3,prtDevnum    ; save device number
;
; prepare parameter lists for saving file mark
; (some values already present)
;
            lda     filprm+1             ; file reference number
            sta     mgetprm+1            ; to GETMARK list
            sta     msetprm+1            ; to SETMARK list
            lda     #00
            sta     msetprm+3            ; mark = 0000,0000
            sta     msetprm+4
            sta     msetprm+5
            sta     msetprm+6
;
; init flags; mark SpoolPrint open; issue DControl call #0
;   (begins spooling...must be done from driver environment)
;
            lda     #00
            sta     security             ; security flag for DControl
                                         calls
            sta     notNow               ; flag during illegal operations
            lda     #80
            sta     pOPENFLG
            lda     #00
            jsr     doControl            ; DC00
            jmp     out1
;
; *************** Event 2 processing ***************
;               dump buffer to disk
;
Evt2        moveW   pXfrBuf,filprm+2     ; address of transfer buffer
            sec                          ; calc number of bytes to
                                         write
            lda     BufMark              ; = current position-buffer
                                         start
            sbc     pXfrBuf              ; zero bytes are legal
            sta     filprm+4
            lda     BufMark+1
            sbc     pXfrBuf+1
            sta     filprm+5
            SOS     WRITE,filprm
            moveW   pXfrBuf,BufMark      ; reset buffer position marker
            rts
;
; *************** Event 3 processing ***************
;      handle multibyte write request for SpoolSave
;
; save zero page contents and replace with source buffer address
;
Evt3        moveW   zpg,saveZpg
            moveB   zpg+1601,saveZpg+2
            moveW   saveSource,zpg
            moveB   saveSource+2,zpg+1601
;
; place a pointer to that zero page address in parameter list
; (request count is already in parameter list)
;
            moveW   pZpg,filprm+2
            SOS     WRITE,filprm
            moveW   pXfrBuf,BufMark      ; reset buffer position marker
;
; replace zero page contents
;
            moveW   saveZpg,zpg
            moveB   saveZpg+2,zpg+1601
            rts
;
; *************** Event 4 processing ***************
;       close disk file after saving rest of buffer
;
Evt4        jsr     Evt2                 ; write out rest of buffer to file
            jsr     closefile            ; then close file
            rts
;
; *************** Event 5 processing ***************
;         restarts after user's floppy access
;
Evt5        lda     #01                  ; control code #1
            jsr     doControl
            rts
;
```

```
; *************** Event 6 processing ***************
;       for closing SpoolPrint-called by interrupt handler
;
Evt6        jsr     closefile           ; first close disk file
            lda     #02                 ; control code #2
            jsr     doControl
            rts
;
; *************** INTERRUPT HANDLER ***************
;                 enter with Y = ACIA status
;
IHandler    .equ    *
            bit     NotNow              ; flag set during envrmt
                                          switch
            bmi     $1                  ; b/ recurrent interrupt
            set1mhz                     ; slow down clock
;
; test ACIA status: bit 6 = Data Set Ready; bit 5 = Carrier Detect
;              bit 4 = Transmitter Data Register Empty
            tya
            and     #60                 ; test 0xx0,0000
            beq     $2                  ; b/ carrier detect ok
            xoffACIA                    ; disable txm interrupts
$1          rts                         ; return from interrupt (NOT
                                          rti)
;
$2          tya                         ; ACIA Status
            and     #10                 ; test 000x,0000 (1 = ACIA
                                          wants more)
            beq     rdyxmt              ; b/ txm data reg NOT empty
                                          yet
;
; if there are any delay bytes, then do those
;
          lda     DelayBytes
          beq     $3
          dec     DelayBytes
          jmp     rdyxmt
;
; send data
;
$3          inc     count               ; increment counter
            bne     $4
            inc     count+1
            bne     $4
            jmp     getmore             ; j/ counter = 0000
;
; X register contains offset to zero page "free" area ($20 bytes)
; must address free area as 00,x; 01,x; etc.
; (if we're here on jsr from driver then X = driver free area)
;
$4          lda     BufMark             ; make pointer in free area
            sta     00,x
            lda     BufMark+1
            sta     01,x
;
            lda     @00,x               ; load data byte (indirectly)
            STA     ACIADR              ; store in ACIA data register
            tay                         ; save data byte
            incW    BufMark             ; increment pointer
;
; calculate delay bytes, if any
;
            tya                         ; recover data byte
            cmp     #0D
            beq     $5                  ; b/ if CR
            bcs     rdyxmt              ; b/ anything>0D
            cmp     #0A
            bne     $6                  ;b/ NOT Line Feed
            lda     LFdelay
            bcs     $7                  ; always branches
$6          cmp     #0C
            bne     rdyxmt              ; b/ not Form Feed
            lda     FFdelay
            bcs     $7                  ; always branches
$5          lda     CRdelay
$7          sta     DelayBytes
rdyxmt      xonACIA                     ; enable txm interrupts
            RTS
;
```

```
; get more data from disk file
;
getmore     .equ     *
            stx      saveX           ; save offset to free area
            xoffACIA                 ; disable txm interrupts
;
; did we jump here from driver or is this an actual interrupt
;
            lda      Zreg            ; interrupt zero page = 00
            bne      $1              ; b/ not actual interrupt
;
; Avoid conflict! Don't mess with original program's floppy access.
;    Test interrupted environment (six bytes down on SOS stack).
;    If ROM-enabled suggests a floppy disk driver (in SOS Kernel).
;
            tsx                      ; get stack pointer
            lda      0106,x          ; interrupted environment
                                       value
            and      #01             ; test bit 0 (0 = RAM; 1 =
                                       ROM)
            beq      $1              ; b/ RAM
;
; wait until safe-set event and leave
; event will restart ACIA output when the floppy access completes
;
            lda      #05
            jmp      doEvent
;
; cross your fingers and switch to user environment
;      (and don't tell Apple)
;
; save stacks, regs, SOS zero page (active portion)
;
$1          tsx                      ; get stack pointer before jsr
            jsr      save            ; saves lots of stuff
;
; change environment
;
            lda      #38             ; standard user environment
            sta      Ereg
            lda      #1A             ; standard user zero page
            sta      Zreg
            ldx      #0FF            ; reinitialize user stack
            txs
            lda      #80             ; set flag to forestall
            sta      notNow          ;    recurrent interrupts
            cli                      ; enable 6502 interrupts
;
; we're there...read 2 more blocks from file to buffer
; first set file mark
;
readem      SOS      SETMARK,msetprm
            SOS      READ,filprm
            sta      errorcode       ; save SOS error code
            beq      $1              ; no error
            cmp      #4C             ; ? end-of-file error
            beq      exit            ; b/ quit if eof
;
; for any other file access error alert operator-then quit
;
            jsr      newconsole
            jsr      filerror
            jsr      restoreCon
            jmp      exit
;
; save file position mark
;
$1          SOS      GETMARK,mgetprm
            moveW    mgetprm+2,msetprm+3     ; result --> next
                                               request
            moveW    mgetprm+4,msetprm+5
;
; count := complement of bytes read from file
;
            lda      filprm+6        ; bytes read from file
            eor      #0FF            ; complement it
            sta      count
            lda      filprm+7
            eor      #0FF
            sta      count+1
            moveW    pXfrBuf,BufMark ; reinitialize buffer pointer
;
; restore previous environment - (including 1 mhz)
;
exit        sei                      ; disable 6502 interrupts
            asl      notNow          ; clears flag
            moveB    buf0100+1,Ereg
            moveB    buf0100+2,Zreg
            moveB    buf0100+3,Breg
;
            ldx      buf0100         ; SOS stack pointer
            txs
            inx
$1          lda      buf0100,x       ; restore SOS stack
            sta      0100,x
            inx
            bne      $1
;
            jsr      restore         ; SOS zero page and user
                                       stack
;
; remove any (old) SOS error codes by calling SysErr with A = 00
; Note: must push return address since SysErr pops one address
;
            lda      pHere+1         ; return address H
            pha
            lda      pHere           ; return address L
            pha
            lda      #00
            jsr      SysErr
pHere       .word    here-1          ; Don't forget the "-1"
;
; clear flag; restore X reg-and we're back again
;
here        ldx      saveX
            lda      errorcode       ; error code from SOS READ
            bne      quit            ; b/ close up everything
```

```
            xonACIA                     ; enable txm interrupts
            rts                         ; return from interrupt (NOT
                                          rti)
;
quit        lda     #06                 ; event #6 will close
                                          SpoolPrint
            jmp     doEvent
;
; *************** SUBROUTINES ***************
;
; SUBROUTINE: save stacks, etc. for environment switch
;
save        stx     buf0100             ; SOS stack pointer
            inx
$1          lda     0100,x              ; save SOS stack (active
                                          portion)
            sta     buf0100,x
            inx
            bne     $1
            moveB   Ereg,buf0100+1      ; save SOS registers
            moveB   Zreg,buf0100+2
            moveB   Breg,buf0100+3
            ldx     #00                 ; save entire user stack page
$2          lda     1B00,x
            sta     buf1B00,x
            inx
            bne     $2
            ldy     #00                 ; save SOS zero page
                                          [C0..FF]
            ldx     #0C0
$3          lda     1800,x
            sta     buf1800,y
            lda     1400,x              ; and corresponding xbytes
            sta     buf1400,y
            iny
            inx
            bne     $3
            rts
;
; SUBROUTINE: restore stacks, etc. after environment switch
;
restore     ldy     #00                 ; restore SOS zero page
                                          [C0..FF]
            ldx     #0C0
$1          lda     buf1800,y
            sta     1800,x
            lda     buf1400,y
            sta     1400,x              ; and corresponding xbytes
            iny
            inx
            bne     $1
            ldx     #00                 ; restore user stack
$2          lda     buf1B00,x
            sta     1B00,x
            inx
            bne     $2
            rts
;
; SUBROUTINE: save present console status-set up normal input status
;
newconsole  .equ    *                   ; open console
            lda     #04                 ; parameter count
            sta     conprm
            moveW   pconsole,conprm+1   ; pointer to name
            lda     #00
            sta     conprm+6            ; no optional list desired
            SOS     OPEN,conprm
            moveB   conprm+3,conref     ; save reference number
;
; get console device num
;
            lda     #02                 ; parameter count
            sta     conprm
            SOS     GETDEVNUM,conprm
            lda     conprm+3            ; device number
            sta     conprm+1            ; to parameter list byte 1
            sta     condevnum           ; and save it
;
```

```
; save present console status
;
            lda     #5F                 ; buffer size
            sta     conStatus
            lda     #03                 ; parameter count
            sta     conprm
            lda     #01                 ; status code #1
            sta     conprm+2
            moveW   pStatList,conprm+3  ; status list address
            SOS     DDSTATUS,conprm
;
; reset console
;
            lda     #00                 ; control code #0
            sta     conprm+2
            moveW   pCtrlList,conprm+3  ; control list address
            SOS     DDCONTROL,conprm
;
; set newline mode = 80 (ON); newline char = 0D (carriage return)
;
            lda     #02                 ; control code #2
            sta     conprm+2
            SOS     DDCONTROL,conprm
;
; prepare for READ/WRITE
;
            moveB   conref,conprm+1     ; console reference number
            rts
;
; SUBROUTINE: restore console to former status
;
restoreCon  .equ    *
            lda     #03                 ; parameter count
            sta     conprm
            moveB   conDevnum,conprm+1  ; console device
                                          number
            lda     #01                 ; control code #1
            sta     conprm+2
            moveW   pStatList,conprm+3  ; stat/ctrl list address
            SOS     DDCONTROL,conprm
;
; close console - (just our access path)
;
            lda     #01                 ; parameter count
            sta     conprm
            moveW   conref,conprm+1     ; console reference number
            SOS     CLOSE,conprm
            rts
;
; SUBROUTINE: input one byte to conbuf
;
input1      lda     #04                 ; parameter count
            sta     conprm
            moveW   pconbuf,conprm+2
            lda     #01                 ; request one byte
            sta     conprm+4
            lda     #00
            sta     conprm+5
            SOS     READ,conprm
            lda     conbuf              ; return with data in A
            rts
;
; SUBROUTINE: input string to conbuf
;
instring    .equ    *
            lda     #04                 ; parameter count
            sta     conprm
            moveW   p1conbuf,conprm+2   ; addr of 2nd buffer byte
            moveW   conbufLen,conprm+4; buffer length (max to read)
            SOS     READ,conprm
;
; string length to first byte of buffer (don't count carriage return)
;
            sec
            lda     conprm+6
            sbc     #01                 ; minus one
            sta     conbuf
            clc
            bne     $1                  ; b/ length>0
            sec                         ; carry set if length = 0
$1          rts
;
; SUBROUTINE: beep speaker
;
bell        lda     #03                 ; parameter count
            sta     conprm
            moveW   pmess5,conprm+2     ; message address
            moveW   mess5Len,conprm+4 ; message length
            SOS     WRITE,conprm
            rts
;
; SUBROUTINE: announce file access error
;
filerror    .equ    *
            jsr     bell                ; beep speaker
;
; display mess4 - "file access error" - wait for operator reply
;
            lda     #03                 ; parameter count
            sta     conprm
            moveW   pmess4,conprm+2     ; message address
            moveW   mess4Len,conprm+4 ; message length
            SOS     WRITE,conprm
;
; input one keypress
;
            jsr     input1
            rts
;
; SUBROUTINE: close disk file
;
closefile   .equ    *
            lda     #01                 ; parameter count
            sta     filprm
            SOS     CLOSE,filprm
            rts
;
; SUBROUTINE: perform control code on this driver - called by events
;       Entry: A = control code number
;
doControl   .equ    *
            pha                         ; save control code
            lda     #80
            sta     security            ; set security flag
;
; execute control call
;
            lda     #03                 ; parameter count
            sta     param
            moveB   prtDevnum,param+1 ; device number
            pla                         ; recover control code
            sta     param+2
;
; NOTE: control list not used but must have legal address
;
            moveW   pconbuf,param+3     ; control list address
            SOS     DDCONTROL,param
            rts
;
; SUBROUTINE: change to system file level 1
;
LevelOne    .equ    *
            lda     #01                 ; parameter count
            sta     param
            SOS     GETLEVEL,param
            moveB   param+1,saveLevel   ; save value of level
            lda     #01
            sta     param+1             ; set new level := 1
            SOS     SETLEVEL,param
            rts
;
; SUBROUTINE: restore system file level
;
oldLevel    .equ    *
            lda     #01                 ; parameter count
            sta     param
            moveB   saveLevel,param+1   ; restore system level
            SOS     SETLEVEL,param
;
            .end
```

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DOS

Filing Made Easy

PART 1

by Christopher U. Light

When the Apple II first came out, random access memory cost a lot more than it does now. For a long time, 16K was the standard RAM configuration. Since DOS uses almost 10K, that didn't leave much room for creative programming. In fact, some early users had to choose between using a disk drive and using hi-res graphics.

For that reason Applesoft was designed without DOS commands. The best way to deal with large amounts of data was to use the Applesoft read and data statements. This situation didn't lend itself to flexible data handling; the data could only be edited by editing the lines of the program, which was fine for the programmer but a nuisance for the user. When systems with 32 or 48K of RAM became more common, DOS was introduced, and Apple programmers got their first taste of text files.

Text files provide a way for Applesoft to write and read large amounts of data to and from the disk. Unlike data statements, text files can't be edited directly from the keyboard at all, but they can be handled by Applesoft. This means that the programmer is free to write elaborate programs to make it much easier for the user to manipulate data. It's a more complicated situation, but overall a better one.

The Hidden Language. As a result of DOS's relatively late introduction into the Apple scene, very roundabout methods must be used in order to fool Basic into issuing disk commands under the guise of print statements. Manipulating text files involves a further degree of fooling Applesoft; DOS sets things up so that reading and writing text files is done with the same commands that Applesoft thinks are reserved for reading from the keyboard and writing on the screen.

Text files are pesky things. They're generated by persuading Applesoft to do things it was never intended to do. Nevertheless, they are the only convenient way to handle data to be used by (but not included in) a Basic program.

Apple's DOS has two types of text files, sequential and random access. Sequential files are more common and use storage space more efficiently, but random access files make it easier for the user to retrieve part of the data. We'll look at both kinds of files in detail in part two of this article. This month we'll examine text files in general by concentrating on commands that are common to both sequential and random access files. As it happens, you end up with a sequential text file by default if you don't specify which one you want, so you'll actually be working with sequential files this time. Don't concern yourself with that for the moment; just think of them as text files.

Most disk commands, such as load and save, can be used directly from the keyboard. None of them can be used directly from a program because Applesoft simply doesn't recognize them. Therefore, it's


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necessary to disguise a disk command as an Applesoft command and prefix it with control-D to let DOS know that the command is intended for it. The Applesoft command used for this is print, and printing control-D followed by a DOS command in quotes will bypass Applesoft and operate the drive.

There are several ways to get that control-D in, one of which is foolproof. Another is almost foolproof and is a little easier. The first one works like this:

```
100 PRINT CHR$(4);"DOS COMMAND"
```

CHR$(4) is an Applesoft way of saying control-D. One thing to remember is that, if the last print command executed ended with a semicolon, DOS won't see the control-D. Even though the control-D doesn't really print, DOS will see it only if it's printed at the beginning of a line.

The second method is to put the control-D in a string variable and then replace CHR$(4) with the variable name in the command. If you put several DOS commands in a program, this approach makes the typing task easier and saves a few bytes of memory. These lines show how this approach works:

```
10 D$ = CHR$(4)
100 PRINT D$;"DOS COMMAND"
```

The D$ assignment must be early in the program, before any DOS commands.

To see control-D in action, place an initialized disk in your drive, type *new*, and run the following small program:

```
10 D$ = CHR$(4)
20 PRINT D$; "SAVE THIS PROGRAM"
```

Check the catalog to make sure the program did what you expected.

Unfortunately, you can't simply "tload" and "tsave" a text file the way you can bload and bsave binary files. Data is transferred to and from text files using existing Basic commands: print and input.

Because a text file is the creation of a Basic program, the only way you're really going to learn how to make and use text files is to take the point of view of a Basic program. Think of it this way. To a user, the input command means, "Enter something from the keyboard." To a program, however, input means, "Go to the keyboard and bring back some data."

Now think of input used to read data from text files. Looked at from the point of view of a Basic program, input is a command to Basic to request data, in this case from DOS. It's not a command to DOS to load data into memory.

All we need, then, is a way to tell DOS to intercept those input and print commands. We do this with the four text file commands we'll be covering this month: open, close, read, and write. Although we'll be using these commands with sequential files only, they apply to both random access and sequential text files.

As always when you're learning new things about DOS, have an initialized disk in your drive that's otherwise blank or that has only programs you can afford to lose. There's always the possibility that you'll make a mistake and accidentally erase or replace one or more files.

Now type *new* and enter the following program:

```
10 D$ = CHR$(4)
20 PRINT D$;"MON C,I,O"
30 PRINT D$;"OPEN TREASURE CHEST"
100 PRINT D$;"CLOSE TREASURE CHEST"
```

Before you run this program, a couple of things ought to be noted. Line 10, as we've seen, defines the string D$ as control-D so that a command in quotes that follows immediately will be taken as a DOS command. In line 20 the command mon tells DOS to print certain information about the drive's interaction with the computer (depending on which parameters follow it). The parameter C results in DOS commands being displayed, while I and O produce displays of the actual data transferred during input and output. Input here refers to data sent from the drive to the Apple, while output refers to data moving in the opposite direction. The commas between the parameters are not strictly necessary and, as Bert Kersey once showed, the name of a small European country, *monico*, works just as well. To turn off the display, use the command *nomonico*.

The Empty Treasure Chest. Run the program now and you'll notice that your DOS commands appear on the screen because of the mon command. Examine the catalog after running the program and you'll see a text file named Treasure Chest. It occupies one sector. This text file was created by the DOS command *open* in line 30.

Opening a new file reserves at least one sector for that file. At this point the file is only one sector long because all that DOS has actually done so far is to enter the name you've given the file into the disk's directory. The directory records the name and type of each file, its length in sectors, and the location on the disk where DOS can find it.

In addition, the command open reserves 595 bytes of the Apple's memory—that's internal computer memory, not disk storage space—as a temporary storage buffer for information being transferred between the disk and the computer. If there's already a file with the name Treasure Chest on the disk, open allocates a memory buffer for that file. It doesn't create a second file with the same name.

After the command *close*, the catalog still shows the file as using only one sector. The file itself is still empty because no command to enter data into the memory buffer was issued. Had the buffer not been empty, however, DOS would have transferred data to the disk as the buffer filled up. The command to close the file saves any information still in the buffer to disk. It then makes a note to itself indicating that the buffer that file had been using is now free and available. After closing a file, you have to open that specific file by name before you can use it again.

Teach Your Apple the Other Two Rs. The other two text file commands used with both sequential and random access files are *write* and *read*. When we look at these commands from the standpoint of the program in the Apple's memory and not from that of the user, we realize that the first deals with output and the second with input. Write refers to transferring data from the computer to the disk, and read to getting data from the disk.

Add the following line to your program and run it again:

```
40 PRINT D$;"WRITE TREASURE CHEST"
```

As before, you'll see when you catalog that your text file is still only one sector long. Neither the write nor read command actually transfers any data to or from the disk. All they do is prepare DOS to look for one of two ordinary Applesoft commands, print or input.

After a write command is executed, print sends output to the buffer reserved for the specified text file instead of sending the output to the screen. After a DOS read command, the Applesoft input command takes data from the file buffer instead of the keyboard. Internally, DOS handles the necessary details of transferring data between the buffer and the file on disk. When the input command empties the buffer, DOS transfers another sector from the file to the disk. When print fills a buffer, DOS transfers its contents to the disk.

Get statements as well as input statements can be used with read, although get can cause problems with monico on. Both DOS read and write commands are canceled by any subsequent DOS statement or just print D$ (if D$ has been defined as control-D).

To enter data into the file, use Applesoft's print command in the usual way after the write statement. Add the following loop to your program:

```
50 FOR I = 1 TO 300
60 PRINT I
70 NEXT I
```

When you run it, you'll see a column of numbers from 1 to 300. Every so often the buffer will fill up, and the column will stop scrolling for a moment while DOS turns on the drive and saves the data in the buffer to the disk. When the file is closed, the last data is saved and the buffer is released for other uses. If you check the catalog, you'll see that the text file named Treasure Chest now uses six disk sectors. Save your Basic program with the name *Write Treasure*. Now modify the Basic program by entering the following lines, save it with the name *Read Treasure*, and then run it.

```
5 DIM A$(300)
40 PRINT D$;"READ TREASURE CHEST"
60 INPUT A$(I)
200 FOR J = 1 TO 300
210 PRINT A$(J)
220 NEXT J
```

This program opens the file created by the other program and reads the information from the disk as input (just as if you were typing it from the keyboard, but a lot faster). Because of the mon command in line 20 the program displays the data and commands as it runs. Finally, the program closes the file and prints the data it has stored in the A$ array. Technically a numeric array (A instead of A$) would be better, but we've used a string array here because we'll need one later. When the program is reading from the disk, you'll see a question mark before each number because of the way we have used the Applesoft input statement, which was designed originally to prompt the user to enter data from the keyboard. We can provide our own prompt by putting a character, word, or sentence between quotes after the word *input*, or we can eliminate the prompt entirely by changing line 60 to read *input"";A$(I)*. If you don't want to see the input at all, type *nomonico* and delete line 20.

Any Old Data Will Do. Lines 200 and beyond are ordinary Applesoft lines with no disguised disk commands, and they illustrate the fact that the data that your program has received from the disk can be used in any way Applesoft considers legal. In fact, any legal type of data—whether string or numeric—can be stored in or retrieved from a text file. In order to show how partial files are saved to the disk when the buffer fills up, we had the program generate 300 numbers.

Now let's see how data for text files can be entered from the keyboard. Delete Treasure Chest from your disk, then load the program you've saved as *Write Treasure* and make the following changes in it:

```
3  FOR I = 1 TO 5
5  INPUT "ENTER A WORD";A$(I)
7  NEXT I
50  FOR I = 1 TO 5
60  PRINT A$(I)
```

The *Write Treasure* program is now similar to a phone list or database filing system. You can retrieve data entered into it as often as you like, even after turning off the computer and turning it on again. Just run the *Read Treasure* program with lines 50 and 200 modified to stop the loops at 5 instead of 300.

Notice that we did not adopt what on the surface would appear to be a logical simplification by entering line 5 as line 55 and skipping lines 3 through 7. In other words, we did not include an input between the write and close commands. Go ahead and try it if you like. What you'll find is that, because the input command contains a buried print command in order to put its prompt on the screen, the phrase "enter a word" will end up in your file. Furthermore, the input command cancels the write command. That's why we filled up the array with data first and then wrote the contents of that array to the disk.

If you try a similar approach in the other direction, however, you'll be okay. Add the line *65 print A$(I)* to your *Read Treasure* program and have the program print as it receives input without filling up the array first. When in doubt and given enough free memory, however, it's probably best to do all of your data manipulation outside the open and close statements, reserving the text file manipulation loops strictly for that purpose.

Read It, Write It, Throw It Away. That should be enough on sequential files, but there's one more thing to mention. You'll notice that we deleted the old Treasure Chest text file—the one with numbers 1 to 300 in it—before we entered words into a new file with the same name. Once a file is opened under any given name, it remains on the disk until deleted. Any time a new file is opened with the same name on the same disk and data is written to it, the data will start at the beginning of the file and overwrite an amount of the old data equal to its own length. Any old data beyond that will remain intact. Thus, unless you delete the old file, you will probably lose some of the old data and end up with a mess consisting of some of the old and some of the new.

DOS has ways to handle this problem directly, which we'll get to next month. Until then, it may be a good idea to open and read the old file, using your Applesoft program to erase, change, or add data to an Applesoft array. Then delete and reopen the file (from your program) and write the entire new file to the disk.

Next month we'll cover random access files. We'll talk about how they differ from sequential files and how to decide whether to use one or the other.

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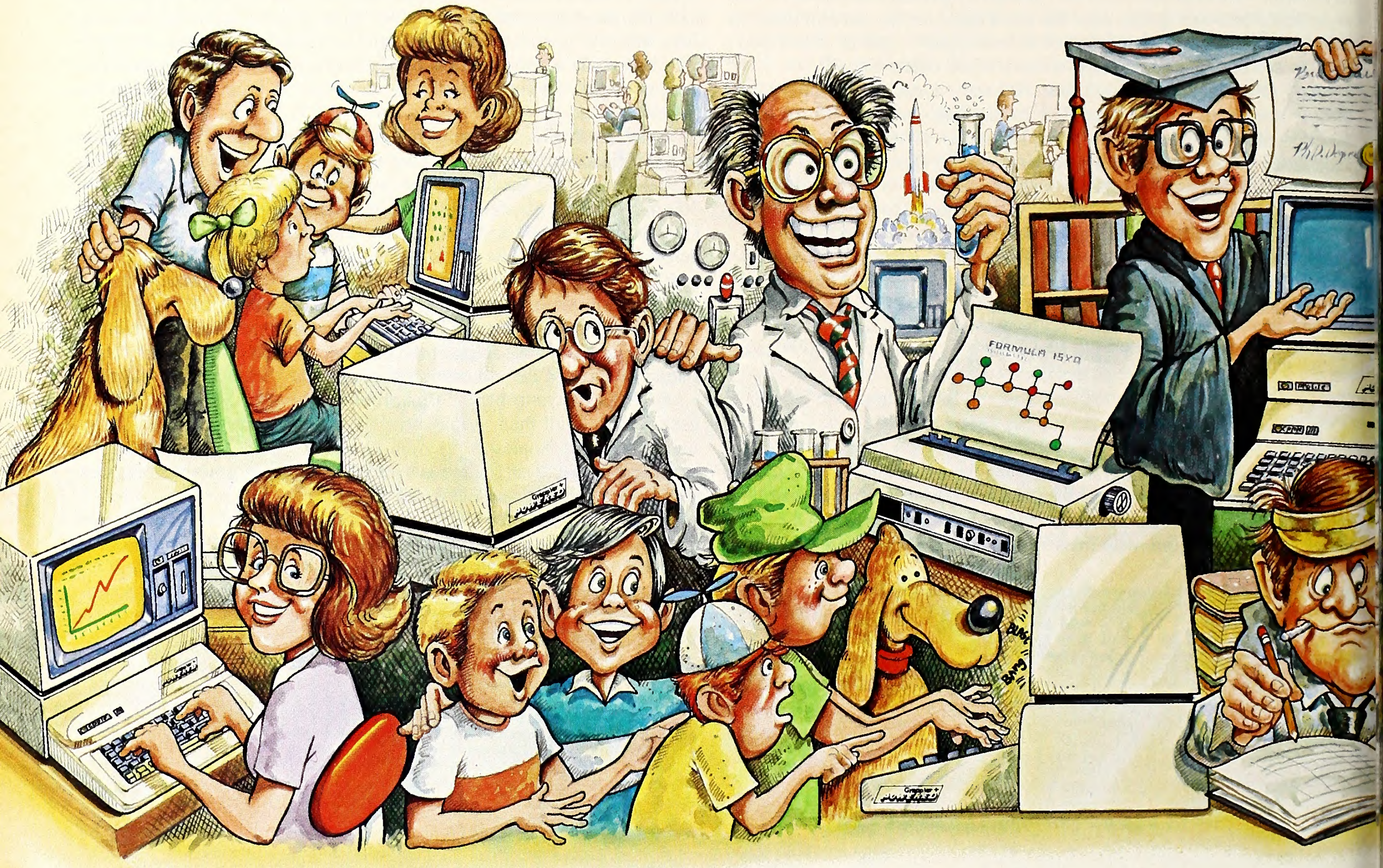

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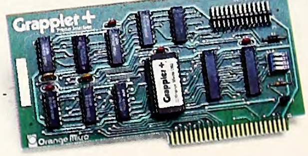

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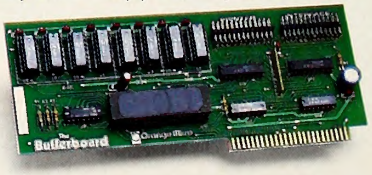

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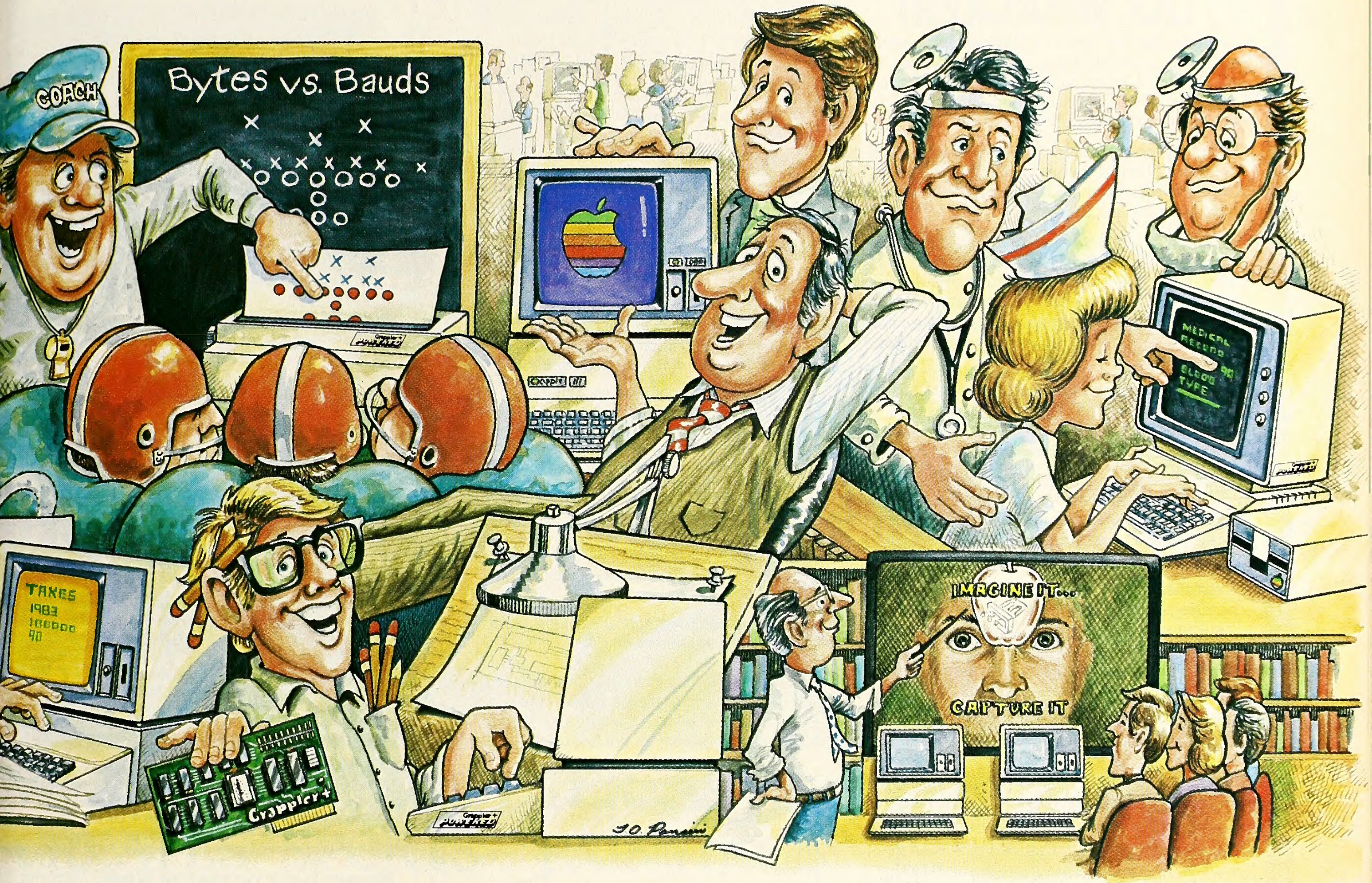

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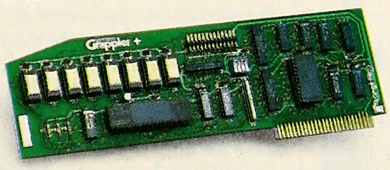

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TAX WHACKER!

The picture below shows my 1983 medical expenses exactly as printed by Money Street. Before year end, I'll use this report to plan tax strategy. Maybe I'll save on income taxes; maybe I won't. At least I get the chance to plan before the year is out.

I'm Bob Payne, co-creator of Money Street, a new checkbook financial system for the Apple. This program saves me money because it doesn't miss a single deduction or tax credit.

But Money Street does more than cut taxes. Look at the picture again. Notice emphasized type face Money Street can coax from my Epson (and many other dot matrix printers). After I'm done with Money Street, I leave my printer "on" and use this type face with my word processor. It's a small extra, but very handy.

Show us a picture. People often ask to see Money Street's reports. They say, "Before I buy, I want to see what it does." We agree, so we've numbered the photo to explain things.

Money Street prints 15 different reports. No set-up is required, just go to the report menu and select which report you want. See it on-screen or print it. Money Street's start-up-to-print-time is less than 20 seconds. Shown below is the "Sort by Code" report:

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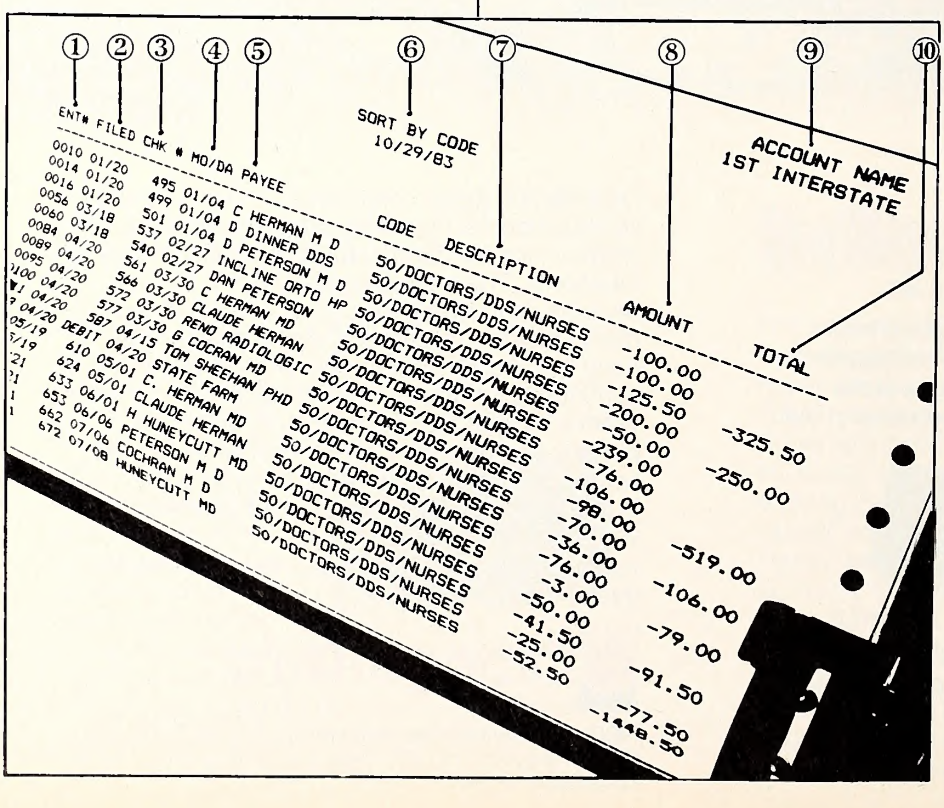
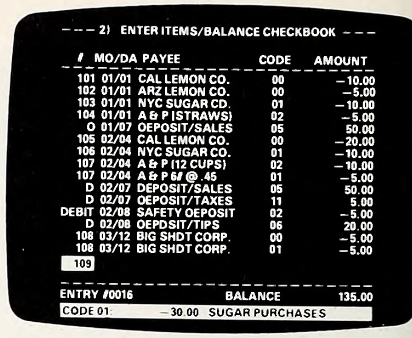
4. You can sort by date to see monthly income, expenses, or net amounts. Print totals or details; just press one key.
5. Not only can you sort by payee, you can sort on a "wildcard" option too. Many Money Street owners use this option to sort tax flag items.
6. All print-outs show the report title plus today's Date. Not shown in photo, but included on all reports, is a spot for your name.
7. You get 100 user-defined codes. To set up codes, just type them in. Add, Delete, or change codes any time without affecting data.

   You can code income items, expenses, or mix both for net amounts, for example, to see profits by categories.

   Sort by individual codes, groups of codes, or entire file. Year-to-date totals are always available with the press of a single key.
8. Yes, you can even sort by amount. It's great for tracking down errors or seeing income or spending patterns.
9. Every Money Street report includes your checking account name.
10. Many reports also include detailed sub-totals, in this case the monthly sub-totals for code 50. Thus you get most of the details needed for budgeting, posting, or financial analysis.





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WEST COAST COMPUTER ARTIST CREATES SPORTS «PAINTINGS»

It was nearly one hundred degrees in the shade, August 6, 1983, at the Riviera Country Club in Pacific Palisades, California. To the thousands of golf enthusiasts gathered to watch the 1983 PGA Tournament, the weather was just perfect.

Reporters and photographers representing all aspects of the media were here for this momentus sporting event. Even the Goodyear blimp was on hand, sailing serenely overhead through the clear blue sky.

But one exciting story didn't happen on the fairways and the greens. In a small tent near the tenth hole, a talented and energetic artist generated "instant computer art" depicting this sporting event.

The only artist currently re-creating live sporting events as computer-enhanced video paintings, Joni Carter uses what she calls "a one-hundred-and-fifty-thousand-dollar paint box."

Carter's paint box surrounded her at the Riviera Country Club that balmy, sweltering southern California Saturday. Four video monitors displayed the image fed from a television network, her computer's palette, the "painting" she was currently working on, and the final video image output. A Sony three-quarter-inch video recorder captured each moment of play, ensuring that she wouldn't miss a portentous putt. The computer, an Aurora Imaging System, sat nestled in the corner, amid the road cases and cables.

"What I'm actually doing," Carter explains, "is grabbing frames, digitizing the video input as the golfers are making their shots, and then going back and painting over the image with the computer.

"There are only two types of systems in the country of this caliber—the Aurora and the MCI/Quantel Paintbox," says Carter. "The two are radically different. The Aurora is a fabulous system to take on site because it's quick and totally dependable."

At an event like the PGA Tournament, some of the final images are sent back out to the television network. Other computer paint-

GOTO page 300, column 2

25 YEARS AND NASA STILL HAS THE RIGHT STUFF

October marks the 200th anniversary of manned flight—on October 15, 1783, Frenchman Jean Pilatre de Rozier made the first captive-balloon ascent. October also marks the twenty-fifth anniversary of the National Aeronautics and Space Administration (NASA), which began operations on October 1, 1958—362 days after the historic launch of Sputnik 1 by the Soviet Union on October 4, 1957.

Since the October 11, 1958, launch of Pioneer 1, a craft that reached a maximum altitude of 71,300 miles, NASA has piled up an impressive list of accomplishments—from planetary probes and Skylab to lunar landings and the current space shuttle program. With the ninth space shuttle mission—which will mark the return of the S.S. *Columbia* carrying Spacelab 1—scheduled to launch on October 28, this month promises to be a time of nationwide celebration of NASA's achievements.

NASA may be experiencing pressure from competitors—Europe and the private sector—and one still hears more about potential projects than about those that actually reach fruition, but the U.S. government agency has earned a pat on the back.

Throughout the month, public-oriented festivities will be held at some of the agency's ten field installations. In addition, many special celebrations are planned for NASA employees. Employees who were with NASA on October 1, 1958, will be in the spotlight.

Tooting its own horn, NASA is participating in the October 16 premiere of the new film *The Right Stuff*—based on Tom Wolfe's bestselling book on the early days of space flight—and in numerous other projects. An hour-long multimedia show recounting NASA's achievements will be made available to planetariums across the country; a record book illuminating NASA's past and future plans will be distributed to more than fifty thousand science teachers in mid-October; and stamp collectors will have a chance to purchase some of the two hundred sixty thousand postal covers carried on the last shuttle flight (the covers have a Twenty-fifth Anniversary NASA cancellation mark).

With the space shuttle program running

GOTO page 302, column 3

25

National Aeronautics and Space Administration

Twenty-fifth Anniversary 1958-1983

New PBS Series Focuses On Educational Computing

At the dawn of the microcomputer age, it became painfully apparent to most adults that the younger generation held the hands-down advantage in the computer games department, so that arena was reluctantly surrendered. But what of educational software and hardware? Who decides whether *Zaxxon* or *Math Tutor* will reign? Will the next generation be capable of zapping an alien armada at ten parsecs but be baffled by simple sums and long division?

Not if television has anything to say about it. More specifically, not if a new series, *Educational Computing Profile*, beginning in September on the Public Broadcasting System (PBS), has anything to say about it.

Produced by Kentucky Educational Television (KET) in cooperation with the Educational Products Information Exchange Institute (EPIE), the new series consists of nine monthly half-hour segments covering developments in the microcomputer field; each show also features comparisons and evaluations of educational hardware and software.

The series uses a magazine format in which each monthly segment is divided into three sections: trends and news, interviews and commentary, and software and hardware evaluations.

The trends and news section is topical, concentrating on new developments in the microcomputer industry in general and also reporting on new products and bestsellers. Timely news, such as stock quotes or governmental action affecting the industry, is also covered in this section.

The interviews and commentary give designers, manufacturers, educators, and parents an opportunity to discuss the major issues affecting computer education. The open discussion format, according to KET, is geared to provide "lively, intelligent, and frequently conflicting perspectives about the changes the computer age has brought."

The hardware and software evaluations segment is also meant to cover "frequently conflicting perspectives" in its head-to-head comparisons between products. Competing products are compared and evaluated on the basis of features, storage capacity, expansion capability, ease of operation, quality of graphics, effectiveness of documentation, and more. The evaluations section is intended to emphasize the information consumers will need when buying hardware or software.

Product evaluation will not be limited to any specific hardware brands or types. One of the first shows features software for the Apple II and Apple II Plus. Later installments will feature evaluations of the Atari 800, the TI personal computer, and accompanying software. According to a KET spokesperson, much of the educational software discussed will be for the Apple, "because there's so much of it."

In order to ensure timeliness, the show will be taped only two weeks before it's aired, to allow coverage of any late-breaking developments in the industry.

EPIE, which is principally responsible for the content of the series, is an educational products evaluation service and a part of the Consumer's Union of the United States, publisher of *Consumer Reports*. Over the past year, EPIE has trained and certified more than three hundred evaluators throughout the country to provide reviews of courseware packages and hardware systems. MT

Old Tariffs May Be New Problems For Modem Users

As the breakup of AT&T continues and we are left to the tender mercies of local telephone companies, a not altogether unexpected hassle may plague residents of some states using personal computers and modems to send and receive data.

The hassle will take the form of higher telephone bills resulting from "information terminal tariffs"—special telephone rates begun during the 1960s by some of AT&T's operating companies for the use of their lines for data transmission.

A case in point was reported in a recent edition of the *Wall Street Journal*. Robert Braver, a personal computer owner in Oklahoma City, saw his basic monthly telephone bill from Southwestern Bell balloon from $9 to $45.90 when the phone company found out he was using a modem.

The tariffs took effect before the personal computer revolution, when only businesses were transmitting data by phone. Local telephone companies say the rates are higher than ordinary residential rates because sending and receiving data involves heavier use of the lines.

Braver, meanwhile, is organizing a fundraising campaign to mount a legal challenge to the tariff, based on the argument that personal computer owners use their modems far less than a business would. He's making contact with potential contributors—via modem, of course. DH

High-Techs Seek To Improve Southern California Image

The feeling of a division between north and south may not be as intense within the state of California as it was nationally, say, at the time of the Civil War, but residents of the Golden State tend to maintain a fair degree of separatist consciousness. Long has southern California been seen as the laid-back, vulgar, rich, no-account relation by the culturally inclined residents of the sophisticated north. Since the advent of the information age and the establishment of its high-profile headquarters in Silicon Valley, the north has added high technology to its list of attractions, which also include opera, big bridges, year-round fog banks, and a subway.

Far to the south, in Brentwood, California, Steve Panzer and Jeff Weiss, partners in the management consulting firm of Panzer Associates, came to a realization. Specializing in high-technology companies, they had occasion to note that 80 percent of all California-bound venture capital was finding its way up to the northern region, to the dismay and resentment of the businesses in the south. This trend was due to the firm identification of the San Francisco Bay Area—in the minds of investors, venture capitalists, and loan officers—with all things computerized. The folks up north had the image and they had the community. Everybody knew everybody else.

Left, Steven Panzer, the force behind the Southern California Technology Executives Network (SoCalTEN). Right, Walter F. Bauer, chairman of SoCalTEN.

After doing a little research, Panzer Associates determined that the southern California computer community's lack of identity and visibility is attributable to the fabled Los Angeles Syndrome—the general absence of a sense of community. Unlike the East Coast MIT computer mafia or the Silicon Valley old-boy network—where most companies are spin-offs of companies down the block—southern California's high-tech firms are simply too diverse. They have been founded by people who come from such backgrounds as aircraft engineering, electronics, show business, telecommunications, and so on. However, the fact that there are so many different areas of specialization also means that there is almost no direct competition among firms. Therefore, reasoned Panzer and Weiss, getting people together shouldn't be too difficult.

As a beginning, the partners talked to twenty-five executives of software companies, peripheral and microcomputer manufacturers, distributors, and OEMs. They found an interesting pattern. "For every CEO who raised a problem, another CEO had found the solution," says Panzer. "Where one CEO was weak in marketing, at the same time he was strong in financial management. Perhaps the most significant finding was that all the CEOs taken together had virtually all the solutions."

And, just as important, "They really wanted to talk to us," recalls Weiss. "They were eager to hear from someone outside."

Panzer and Weiss's idea was to form a network of information—not to ferret out technological trade secrets but to supply help in managing companies, building relationships in the business, and generally increasing the public's awareness of southern California as a bustling center for high technology. Deciding to go farther than Silicon Valley's tight-knit but informal network, Panzer and Weiss founded the Southern California Technology Executives Network (SoCalTEN).

By the first organizational meeting in May, the group had the attention of forty-seven area companies including Ashton-Tate, Datamost, Datasoft, Edu-Ware, Micro/Sys, Callan Data, Corona, and Axiom. At the first official meeting in July, more than a hundred companies were represented. At that gathering, two venture capitalists and the CEOs of two fast-growing companies delivered keynote speeches on dealing with marketing problems. Then the meeting broke up into round-table discussions.

Now, by providing a monthly summary of information from management, technical, and market sources, a schedule of network conferences and seminars, and a membership resource directory, SoCalTEN is helping to remove the proverbial chip from southern California's high-tech shoulder.

Having focused initially on the western portion of the San Fernando Valley—where many computer peripheral manufacturers are concentrated—SoCalTEN now covers all of Los Angeles County and has plans to draw Orange County firms into the network soon.

Panzer Associates is continuing its research, in an effort to "identify the critical factors in the management of rapid growth and marketing strategies," says Panzer. "We are exploring the possibility of a 'corporate university'—a place where executives and managers could learn from the seasoned leaders, and where we could all learn from each other." AC

«Paintings»

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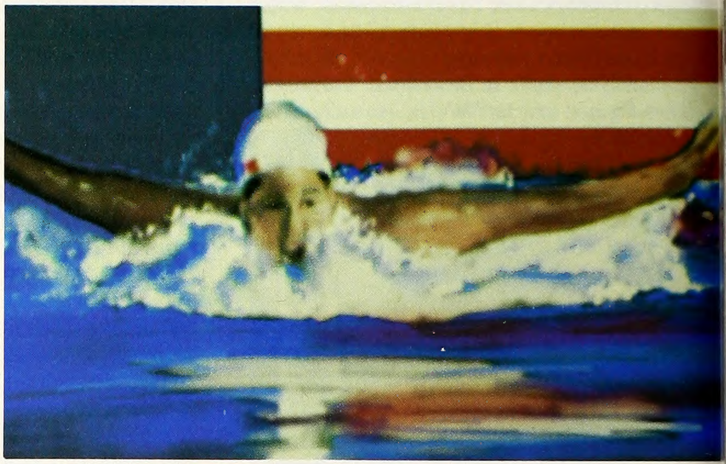
ings may be patiently modified, pixel by pixel, until Carter is ready to convert them to hard copy. These latter works become either gallery pieces or limited-edition prints. Carter produced a limited series of paintings from this year's PGA Tournament.

"If I'm creating a piece of artwork that I definitely want to reproduce for a gallery, then obviously I give myself a great deal more time," she explains. "If I'm creating artwork for broadcast on television, that's something entirely different."

Opposite page (clockwise from upper left): Carter's rendering of a racehorse; the moment after Hal Sutton made his winning shot at the 1983 PGA Tournament; a scene from last year's Bay to Breakers marathon; Carter's self-portrait. This page: right, Paintbox rendering of a swimmer; below, the Riviera Country Club.



A self-taught artist who has sold numerous pieces of art—including lithographs and silkscreens, as well as computer paintings—Carter looks upon the technology she now employs as a tool for creative expression. "These systems are really more for the artist than for the technician; they're very simple to use."

Carter, using a graphics tablet, can adjust the luminance and hue levels of a single color, producing hundreds of shades of that color. The system Carter uses also enables her to achieve multiple shades of flesh tones with relative ease.

"When I used to paint, I would sit for hours mixing little dabs of paint. There might be seventy-five shades of color in a face. The computer will give you the same range of colors instantly."

You'd have to buy a lot of paint to equal the total number of colors possible on the Aurora's color palette, an astronomical sixteen million.

Carter's portfolio of "Instant Replays" of major sporting events includes the Major League Baseball play-off aired on ABC last October. "There, I worked ten days live, hooked up via satellite to both the National and the American League games."

Carter has also created on-the-spot art for display on Dodger Stadium's Diamond Vision screen. And she has done "instant computer art" for the NFL and the NBA, as well as for marathons, such as San Francisco's Bay to Breakers '82 race.

Working with television live on location poses its own unique problems. The bright sunlight reflecting off her monitors makes them difficult to read and, as in all live productions, timing is critical. Some of Carter's paintings have had to be digitized, touched up, and ready to air in less than three minutes. "The last time I worked for ABC," Carter recalls, "they just broadcast the paintings alone. They

didn't use them for bumpers, backdrops, or logos. They used them as pieces of art at the end of every inning during the baseball play-offs."

Carter created more than 220 pieces of art during the play-offs and ABC used about seventy-five of the paintings. In the last game of the National League play-offs, ABC finished the broadcast with her portrait of Ted Turner, owner of the defeated Atlanta Braves.

Working with television has offered Carter many opportunities for creative experimentation, not just in the direct broadcast of her computer paintings.

"When I first discovered the computer, one of the things I started creating was hard copy as artwork. I sold prints to some of the studios for use on a variety of sets.

"It was a fabulous experience," recalls Carter. "Art directors and set decorators would say, 'Joni, we've got a set that needs some flower designs. These are the colors. . . .' I would run over to the computer and create some bizarre flower designs. Then the AD [art director] would come back at the last minute and we would play around with the designs and the colors. We might get twenty-five different pictures from that one design."

Carter uses a process that results in a Sepichrome print, which bears more resemblance to an oil painting than it does to a conventional computer printout. The process involves using a special computer camera, which takes a direct RGB signal in and converts it into

GOTO page 302, column 1

«Paintings»

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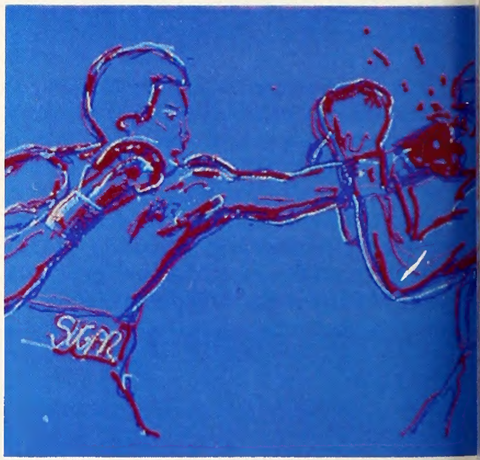
thirty-five-millimeter slides. The slides are then made into prints by a local graphics printing firm.

A problem Carter faces from time to time is equipment incompatibility. "You can do the greatest piece of artwork in the world on the computer. Then it comes time to hook up the computer camera and it doesn't work. You wind up with a not so good print. Sometimes you're fighting technology the whole way."

With the aid of her sister, Kate Richardson, who is vice president of Carter's company, and Aurora engineer Todd Hitzeroth, Carter is currently involved in a major project at the Museum of Science and Industry in Los Angeles, her base of operation. The group is preparing what is expected to be the world's largest hands-on computer graphics display—featuring graphics generated on a host of different computers—from Apples and Ataris to Auroras and Quantels—that will be simple enough for children (and even adults) to use.

Also in the works are plans for the 1984 Summer Olympics. Carter intends to have pictures from all the Olympic sites transmitted to the museum as the events take place. She also plans to paint a special series of Olympic scenes for display on monitors throughout the museum. HAS

Clockwise from upper left: another painting from this year's PGA Tournament; Dodger pitching ace Fernando Valenzuela as interpreted by Carter using the Aurora; a generic football painting created on the MCI/Quantel Paintbox; a computer "sketch" of fighter Sugar Ray Leonard and opponent; a moonlit skiing scene created on the Aurora.



NASA

continued from 297

fairly smoothly and with several projects—the Galileo Jupiter probe, the Space Telescope, and a possible orbiting space station—on tap for the near future, NASA is forging ahead. All of us earthbound folks have benefited greatly from the efforts of this organization, and, if the past is any indication, we should continue to do so in times to come. DH

NEWSBITS

☐ **"I Still Have the Utmost Confidence in This Mission."** MGM/UA has announced plans to film Arthur C. Clarke's bestselling sequel to the film and book *2001: A Space Odyssey*. According to a two-page ad in *Daily Variety*, *2010: Odyssey Two* is scheduled to be completed in time for a Christmas 1984 release. That's fourteen months from now. The first film took almost three years to make. Assuming that the filmmakers follow Clarke's book, which has been in bookstores almost a year now, the film *2010* will mark the return of HAL (you remember HAL) to the big screen. Who cares about Dave Bowman/the Star Child/whatever? What happened to HAL after he burbled out "Daisy" and promptly went to supercomputer heaven? Well, you can wait a year and two months and see the movie, or you can read the book.

☐ **Get Out Your Slide Rules.** Will the Japanese computer invasion become the Japanese abacus invasion? Not likely, but the soroban, or abacus, is enjoying a surprising comeback in Japan. Apparently, dozens of corporations are sending their employees to *soroban jukus*—cram schools—for refresher courses. Experienced users can shift the beads of an abacus back and forth faster than they can push the buttons of a calculator. Winners of a recent national soroban championship solved twenty problems, each involving the addition of twenty eleven-digit numbers, in less than five minutes.

☐ **And on the Future Music Scene.** In May 1983, *Softalk* visited with jazz and funk musician Herbie Hancock, who at the time was working on a new album. Well, that album is now in the stores; it's called *Future Shock* (Columbia Records) and features six tracks. Hancock is not the only musician on the al-

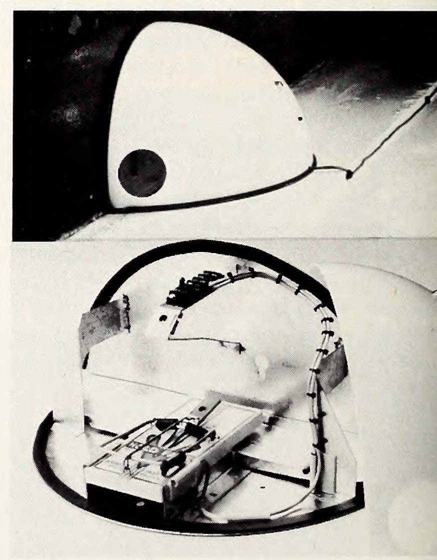
bum, but his multisynthesizer keyboard playing is evident on every cut. A richly layered dance album, with bopping rhythms and only occasional vocals, *Future Shock* finds Hancock using a host of different synthesizers—the Rhodes Chroma, Mini-Moog, Yamaha GS-1, alphaSyntauri, and several others. Hancock effortlessly mixes these modern sounds

with live and electronic percussion, live and vocoderized vocals, and even occasional sprinklings of acoustic piano. The result is a fascinating, sometimes exhilarating journey through the musical world of synthesized funk—a world seemingly far away from the "information age," but not, alas, far away technologically.

☐ **Tubular Computer Shopping Malls, Part Two.** AT&T Information Systems is one of about three hundred fifty high-tech companies leasing space in Infomart, a new market-support center for the information processing industry. Presently under construction in Dallas, Texas, Infomart is scheduled to open in the fall of 1984. The 1.5-million-square-foot facility will house the permanent showrooms of such companies as AT&T and will also offer a continuous schedule of trade shows, seminars, symposiums, and meetings directed to specific high-tech industries and product areas. Infomart is being built to resemble London's Crystal Palace—one of the most successful merchandising exhibit facilities in history—and is part of the 185-acre Dallas Market Center, which features 7.6 million square feet of display and demonstration space serving seven basic industries.

☐ **Sheep-Shearing Robot.** With nine times as many sheep as people, Australia relies on wool as one of its biggest export industries. For years, researchers in that country have been trying to develop better, faster ways to shear sheep, but progress has been slow. Recently, the University of Perth announced the development of a robot that can shear 80 percent of a sheep's body with the help of what developers are calling Software Sheep. A program tells the robot—an industrial robotic arm normally used for welding—how to guide the shearing razor over the body contours of an average sheep. To compensate for the individual peculiarities of a sheep, the automated system takes different body measurements of the sheep before the animal reaches the robot. Also, sensors on the robot arm provide a warning if the razor head gets too close to the sheep's skin. Researchers have yet to program the robot to shear the more sensitive parts of a sheep, the head in particular. Also, the robot works about a tenth as fast as an experienced human shearer. Developers of the system say it will be another ten years before the system is available commercially.

☐ **Eighty-Five Years Later and Finally a Better Mousetrap.** So you thought you knew all about RAMS and CPM. Well, you may be in for a surprise. RAMS (Rodent Activity Monitoring System), offered by Ace Pest Control (Culver City, CA), is the key element in a computerized service called CPM (Commercial Pest Management). Designed for businesses that normally have problems with insects, rodents, and other pests, RAMS automates the routine job of checking traps. Conventional trapping devices, such as snap traps, glue boards, and Ketch-Alls, are housed in a protected monitoring device, which is connected to a digital "activity transmitter." Whenever a trap is disturbed or sprung, the activity transmitter sends a message to a central computer at Ace Pest Control. An Ace technician then empties the traps and records in a CPM report such information as the date, infestation, location, and type of pesticide used in each part of a building. This information is kept in the central computer, providing a permanent log of a company's pest control program. According to Ace, trends become immediately evident. The idea is to identify trouble areas and follow through with preventive measures. Mickey and Minnie, consider yourselves forewarned.



☐ **A Must for Satellite Heads.** The Public

Service Satellite Consortium (PSSC) is holding its eighth annual conference and exposition October 18–21 at the Washington Hilton Hotel, in the nation's capital. The first day's program is aimed at lending officers, banks, insurance companies, venture capitalists, public service organizations, and other interested investors. The conference will also look at direct broadcast satellites, satellite teleconferencing, launch risks, recent disasters and how they can be prevented, and new satellite systems. Contact the PSSC in Washington, D.C., for details.

☐ **SM (Science Museums) and Ex-Slaughterhouses.** In the mid-seventies, a large multistory abattoir on the northern edge of Paris was built but never put into operation; new meat-processing and transportation techniques made the facility obsolete before it was completed. So, the French government decided to convert the unused slaughterhouse into a national science museum. The museum project—the National Museum of Science, Technology and Industry of the Park of la Villette—was initiated in the late seventies and is scheduled to be completed in 1986. The museum will feature four basic sections—labeled *exploring*, *using and producing*, *living and inhabiting*, and *communication*—and a total of twenty themes, everything from the human brain and the transformation of matter to computers and the relationship between the arts and the sciences.

☐ **A Different Kind of Synthesizer.** Anyone who owns an Apple and is doing research-scale peptide synthesis may want to check out the Coupler 1000 from Vega Biotechnologies (Tucson, AZ). The Coupler 1000 costs a little under twenty thousand dollars and is controlled by an Apple IIe. The Coupler 1000 features "fill-in-the-blanks" synthesis software, a cross-contamination-free chemistry module, chemically inert plumbing, and interchangeable reaction vessels.

☐ **CADI and Diabetics.** As early as this fall, diabetics will have the opportunity to purchase a hand-held computer that will assist in prescribing the proper dosages of insulin on a day-to-day basis. CADI, computer-assisted diabetic instruction, is currently being developed at the University of Alabama in Birmingham's Diabetic Research and Education Hospital. Diabetics will spend a week in the hospital to see how they respond to different foods and control insulin doses. The test results obtained will be fed into a database and programmed into participants' hand-held computers. Patients will have twenty-four-hour-a-day access to the hospital's database via telecommunications. Only two diabetics are in the CADI program now, but twenty-five are expected by year's end. Through more efficient blood sugar control, CADI developers say, diabetics can have a more flexible lifestyle.

NEWSPEAK STAFF

Editor David Hunter
Contributors Andrew Christie, Howard A. Shore, and Michael Tighe

S·T·O·R·Y·T·A·L·K F·I·C·T·I·O·N

ARCADE MAN

BY JOHN MARTELLARO

It was luck. Some people say that the best pilots have the best luck, but this pilot could only curse himself for letting the enemy plane slide in on his tail. There was no time at all for any smugness in having caught that fleeting glance as the silver jet slid across his rearview mirror. There was about one second to make a decision.

He tucked his feet in, jerked the stick back with his left hand while the right pulled hard on the eject ring. The last thing he saw before things went black was his jet exploding beneath him.

James Bartlett climbed out of the booth with a smile on his face. He had just become the only person to beat the F-16 arcade game anywhere, anytime. Never had there been an arcade game as sophisticated and realistic, with its precisely simulated cockpit and three-dimensional projection dome. After hundreds of attempts, James had flown his air cover mission, destroyed three tanks, shot down seven planes, and still "lived" to tell about it. All this at the age of seventeen. Visions of appearing on national talk shows danced in his head until his girlfriend, Carol, forced her way through the crowd and came running over to throw her arms around him. The kiss she planted on his lips brought James to gasping for air. The arcade owner waited patiently with the certificate in hand, and everyone laughed while James struggled to extend one arm to accept the award. He was swimming in the euphoria of the moment. The ten years he'd spent working the arcade games had finally paid off in a big way. He was the best.

It took a long time to wind down. That night, James took Carol out and they celebrated. And celebrated. And when they went to the beach later that night, they celebrated some more. Lying beneath the stars, James held his girl and thought about the most exhilarating day of his life. It couldn't get any better.

A week later, James was back in the arcades and found himself forced to sign autographs between sessions. He wasn't ready to fly again; so he just relaxed with some of the more primitive games. One of his favorites was *Dresden-Blitz*. He didn't notice when one of his friends, Scott Kenny, slid up to the booth next to his. Scott played for a little while, then abruptly blurted out. "Cathy just ditched me," he said, slamming his hand on the console.

James jerked his head up, startled. He glanced over to Scott, but had nothing to say to the outburst.

"We had a fight. It's all over," Scott said grimly.

James watched Scott play for a few seconds and it was obvious that his friend's timing was considerably off. James let his own fighter splatter into the mountains and began to watch Scott coldly, waiting. He had never seen his friend so upset.

"You really don't give a shit, do you," Scott said.

"I just splattered my quarter all over the countryside so I could listen."

"What a friend. One splashed jet for the downtrodden." Sarcasm dripped from Scott's voice.

"I'm listening, okay? And I'll loan you another quarter to replace the one you're about to blow. What else can I do?"

"Okay, Mister Ace. Cathy is gone. My car is busted. If I don't get married, I get drafted. And you stand there and tell me the best you can do is toss me another quarter. Okay. So toss me that quarter and go home. Don't forget to buy a frame for your certificate."

James just shook his head. He could think of no response, so he left.

When he got home, his parents were in the living room watching the television screen intently. Only his mother saw him come in, but she scarcely noticed him. The president was looking extraordinarily sober and pointing to a map of the Near East. James watched for only a second because something smelled good coming from the kitchen, so he detoured through, sniffed the pots, and grabbed a cookie. He went to his room and flopped onto his bed to wait for dinner. Lying there, he watched his model airplanes, suspended from the ceiling on threads, twist in the air currents from the open window. The evening sun flickered and played on the walls as the light passed through the trees outside his window. It was a great June evening and life was good. James counted his blessings. He'd graduated from high school in May with passable grades, and he was looking forward to going to the university with Carol. He had earned enough prize money to pay his tuition. His

ordeal in the F-16 didn't get him on the talk shows, but he'd been interviewed by the local news in Los Angeles. He did worry about Scott a little, and Scott's plight with Cathy made him feel a little guilty. Suddenly, his musings were interrupted.

"James? Can you come down?" his mother called from the stairwell. "Your father and I want to speak with you."

He pulled himself out of bed and skipped down the stairs. There was undue concern in his mother's voice, and James became apprehensive. When he came into the living room, the television was off. That was a bad sign. He sat down and noticed that his father did not appear to be acting normal either. There was coldness and evasion in his father's eyes and tears in his mother's. His father held out a letter to him and walked away with his head down when James took it. James Bartlett looked at the envelope. It was from the Selective Service. He didn't need to read the letter inside to know what the problem was.

There were good things about West Germany, but most things were bad. The weather was terrible. Instead of being bright and cool in October like his San Diego home, it was cold and drizzly. The barracks were communal and always cold. There was no place to go unless one considered Kitzingen the bright spot of the world. What most filled his life was mud. The tanks drove in it. He walked in it. He sat in it. The barracks always had it on the floor. Only the insides of the tanks were free of it by virtue of the fanatical care of the tank crews. His life consisted of wind and water and mud.

The redeeming virtue of being in Kitzingen was that no one was shooting at him, which wasn't the case with his unfortunate brethren pinned down in the desert a few thousand kilometers away. James was beginning to hope he could serve out his time as an M-1 tank driver and be done with it.

At first he thought about Carol a lot. He had dreadful images of her sitting in tight shorts on a grasy knoll at the university waiting for some lucky fellow to come along and invite her to his room. He soon realized that such thoughts weren't helping him get through the mess he was in. Carol had said she would wait, so James forced himself to stop worrying about her and eventually decided that perhaps he'd fall in love with the blonde Fraulein who served beer at the base NCO club.

After James had spent three weeks struggling to drive a tank (through mud) without dropping a track, his platoon sergeant, Fred Hammond, called him into his office.

"Bartlett? What are we going to do with you?"

"What do you mean, sir?"

"How long is it gonna take you to learn tank driving? Leaving your busted tracks in mud holes is frowned on, son. Didn't you learn anything at Knox?"

"I'm trying, sir. I just need more practice. Alone."

"Ha! We don't have time for that crap. In case you forgot, there's a war going on. We need people who can learn together as a team. Anyway. We're short of gunners now. I think you've had enough driving. I hear you were a pretty hot shot in the arcades."

"I guess so," James said quietly.

"Speak up, Bartlett!"

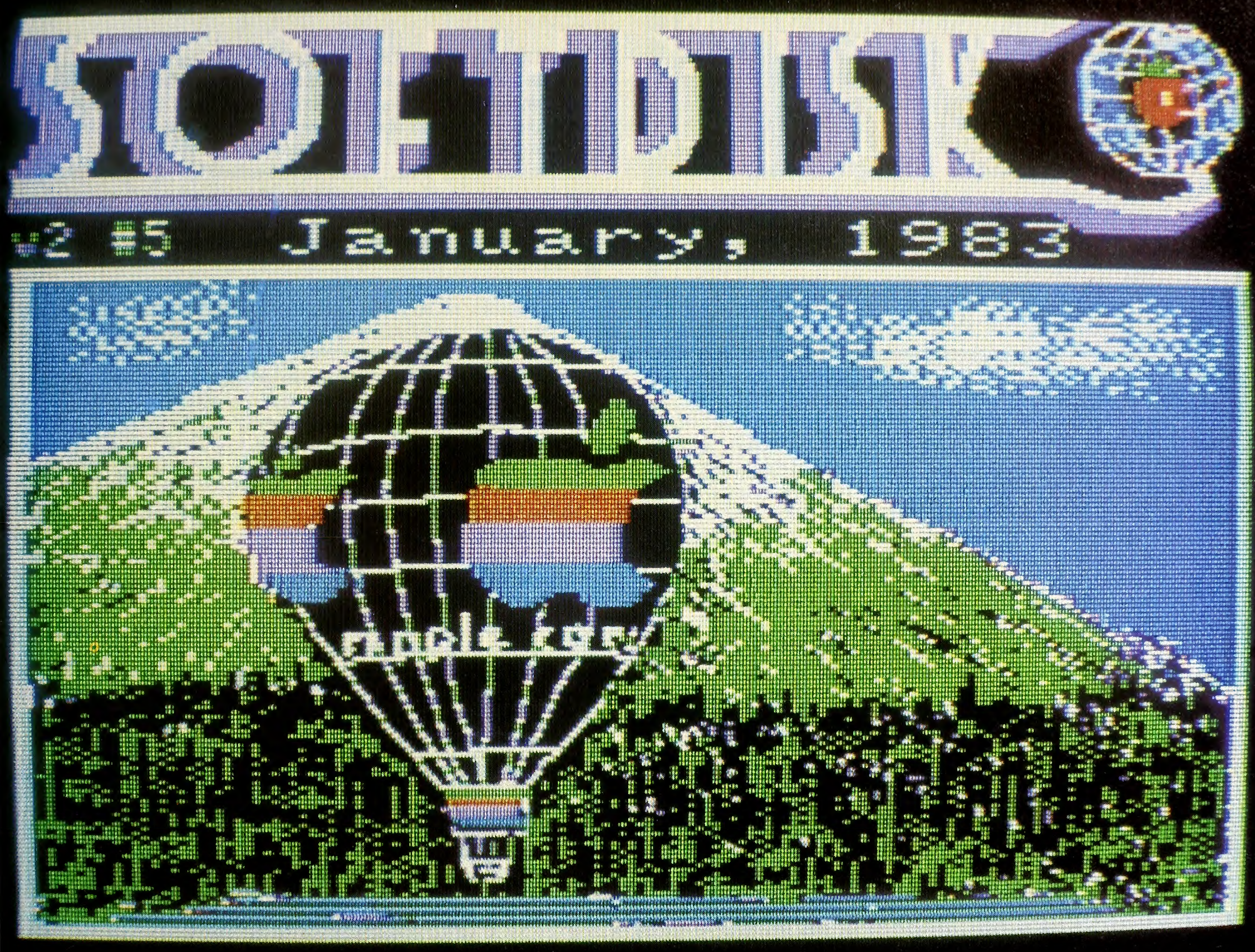
"I don't want to be a gunner. Sir."

"No matter. What you want isn't important now. We need gunners real bad, and that's all there is to it. I've already made arrangements with your tank commander. Gunnery practice at 1400 tomorrow."

"Is that all?"

"Hell no! You will show up at the motor pool tomorrow morning to wash down tanks and drive them to the airfield. Be there at 0800. And Bartlett. Try to shoot better than you drive. We need some good gunners in this army."

James sat at a table by himself in the NCO club and sipped a tepid beer. The air was filled with smoke and alcohol. The crowd was amazing. Behind him, some other privates were jostling each other around an arcade machine playing *Battle Zone* and laughing. James didn't feel at all like dropping a coin in the box. He spent a lot of time instead watching Fraulein Schmidt and staring into his beer. He looked up from his glass to see his tank commander spot him and walk toward his table. Staff Sergeant DeVigeo pulled up a chair.



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Softdisk requires Applesoft and DOS 3.3

"You don't look so good, Bartlett," he said.

"So what else is new?"

"I'm told you're going to be my gunner now."

"Wasn't my idea." James took another sip of his beer.

"I know you'll do a good job."

"If they'll give me some time to practice," Bartlett said, "I may be able to."

"Well, don't take too long. Word has it that we may not be here much longer. Get good while you can."

Suddenly the picture came into focus for James. West Germany had been the cream, not the dregs. No more Saturday nights in Frankfurt, no more getting looped during the Oktoberfest and grabbing the Frauleins, no more driving tanks around in the nice, safe mud. Things were not looking up. He never did remember what happened the rest of that night.

The light was blinding. James was hot and sweating. He peered into the sight and strained to see over the next sandy hill. He knew the enemy was there. How he knew, he didn't know. But he was ready. The round was loaded. At eleven hundred meters, the shell would take less than a second to impact. He tensed and danced his finger over the trigger. He wouldn't hesitate when the dark shape rose up. Simply squeeze and cross off another enemy tank.

But the enemy never appeared. James waited. And waited. Then there was an incredible blast. He was thrown to the tank floor like a rag doll and flames appeared everywhere. He couldn't breathe. He couldn't hear. He knew he was going to die, trapped in a metal inferno. He thought of his parents. He thought of Carol. He struggled to open the hatch, but it seared his hand and wouldn't budge. James Bartlett died.

Then he opened his eyes. The barracks was very still. A single lamppost cast a pale white light on the foot of his bed. It was snowing lightly, and James was cold. He shivered and tried to slow his breathing. He pulled the covers up and lay there thinking.

It had been pretty much the same dream the past two months. Sometimes he won, and there was great glory. Carol drifted in and out of those. Sometimes he lost, as in this one. Sometimes when he dreamed about dying, he thought about deserting. But he knew he couldn't do that. He was the Ace.

He looked at his watch. Four in the morning. At eight his plane would leave for the Near East with a refueling stop in Istanbul. Still shaking, he got up and dressed.

They found him at the PX Laundromat glued to the *Tail Gunner* arcade game. He had rolled up a record score in four hours on a single coin. Sergeant DeVigeo had to physically remove James from the console, pump a cup of coffee down him, and virtually carry him to the C-141. James said nothing all the way to the airfield.

Once in the air, DeVigeo started to talk to him.

"Better wake up, son. I hear we're getting the crap beat out of us down there. This is no time to freeze up."

"I can handle it," James said very slowly.

"Anything I can do?" said the sergeant.

"Just remember to call me Ace."

"Okay, Ace. We'll kick their butts, huh?"

"What happens when we land?"

"We form up with the rest of the company and drive our tanks to the front. There won't be much time to waste."

"Will we be shot at right away?" James said, shaking a little.

"Yes."

Being in a tank in the desert is like taking a tour in an oven. The dust was choking. The smell and the noise were almost unbearable. James added to the smell by being unable to unbutton a hatch and throw up outside. His platoon had been in the desert all afternoon, dug in and cooking. Suddenly, DeVigeo was yelling at him. The loader was yelling at him. James rose up with a start, hitting his head against the in-

struments. He grabbed for his helmet, put it on, and wiped the blood off his cheek. He tried to get the laser range finder working, but suddenly it wouldn't work right. DeVigeo yelled at him some more, and this time he could make him out.

"Smoke clouds at 020! Get on the flir and load armor piercing!" DeVigeo yelled into the intercom.

James never cared for the flir because its imaging was poor. He looked into the visual sight and switched to wide field-of-view. Momentarily, the ominous row of T-80s rumbled out of the clouds. James saw a TOW zoom by and quickly switched to narrow field-of-view, as he tweaked the turret to bear on one of the tanks.

"They're here! Nail somebody, Bartlett!"

James slewed the reticle onto the vague-looking target barely visible through the swirling dust. There was no time to tell anyone or worry about the fact that the laser had stopped working. He wiped more blood from his eye, estimated the range, and squeezed off the round in panic. It missed. The loader had another round in immediately. James went back to the reticle just in time to see a muzzle flash from the enemy tank and realize that it was aiming at him. A second later, his tank was enveloped in a deafening roar and James was rocked from his position. Struggling, he got his eye back to the eyepiece, but the turret was offset, and he had to slew back onto the target. While he centered the cross hair, it dawned on him that this guy in the other tank was trying to *kill* him. James froze for a second while he thought about that, then he pulled the trigger again. He never saw if the round hit.

It was a sunny day in February as James Bartlett walked along the campus pathway between the business and math buildings. The sky was high and blue and breezy. The trees rustled lightly in the wind. It was a good day to be alive, even without a right arm to carry books. James wrestled his backpack off with his left arm and sat down on a cement bench in front of the business building. The student traffic was heavy, and an occasional passerby stared at his arm. The next time he looked up, his old friend Scott was standing before him.

"Back from the wars?" Scott said, looking uncomfortably at the shoulder where James's missing arm used to be.

"Yeah. Back for good."

"How are we doing?"

"We're losing pretty bad."

Scott looked puzzled. "What do you mean, man? I figured we'd go over there and clean up on those guys."

"Want to go? I can get you signed up easy," James said.

"No way. Cathy and I are getting married. I'm hanging onto my conscientious objector status in the meantime. Besides, I think the war stinks. Who gives a damn about the East?"

"Getting shot at stinks," James said.

"Well, you shouldn't have gone," Scott said as he watched a coed walk by.

"I shouldn't have gotten my crew killed either."

"What happens now?" Scott asked.

James shrugged. "I suppose I'll get my bachelor's in business. Try to find a job. Try to find a girl with a fetish for one-armed guys."

"What about Carol?"

"She doesn't have any fetishes," James said.

"Well, good luck," Scott said, trying not to look at the stump.

"So go play house."

James walked home after class, down the main drag, to his apartment. All the students he saw seemed so young. The arcade shops, one every few hundred yards, were teeming with students. He stopped and looked in the window of one to watch the frenzy. A girl with her back to him, who might have been Carol, was arm in arm with a tall fellow. The lights flashed and the speakers crackled with the sound of phasers and cannons and crashing ships. James struggled with his left arm to reach into his pocket for a quarter, found one, and held it tightly. He stood and watched with his hand clenched around the quarter.

When he saw that the girl was not Carol, he continued his slow walk home. Presently, he saw an old man squatting in front of a Salvation Army store with a metal cup in his hand. James walked up to the raggedly dressed man, pulled the quarter out of his pocket, and started to drop it into the cup. Then he stopped and angrily, with a jerky motion of his left arm, threw it as far as he could into an empty lot. James Bartlett, ex-Ace, invited the man to his apartment for dinner.

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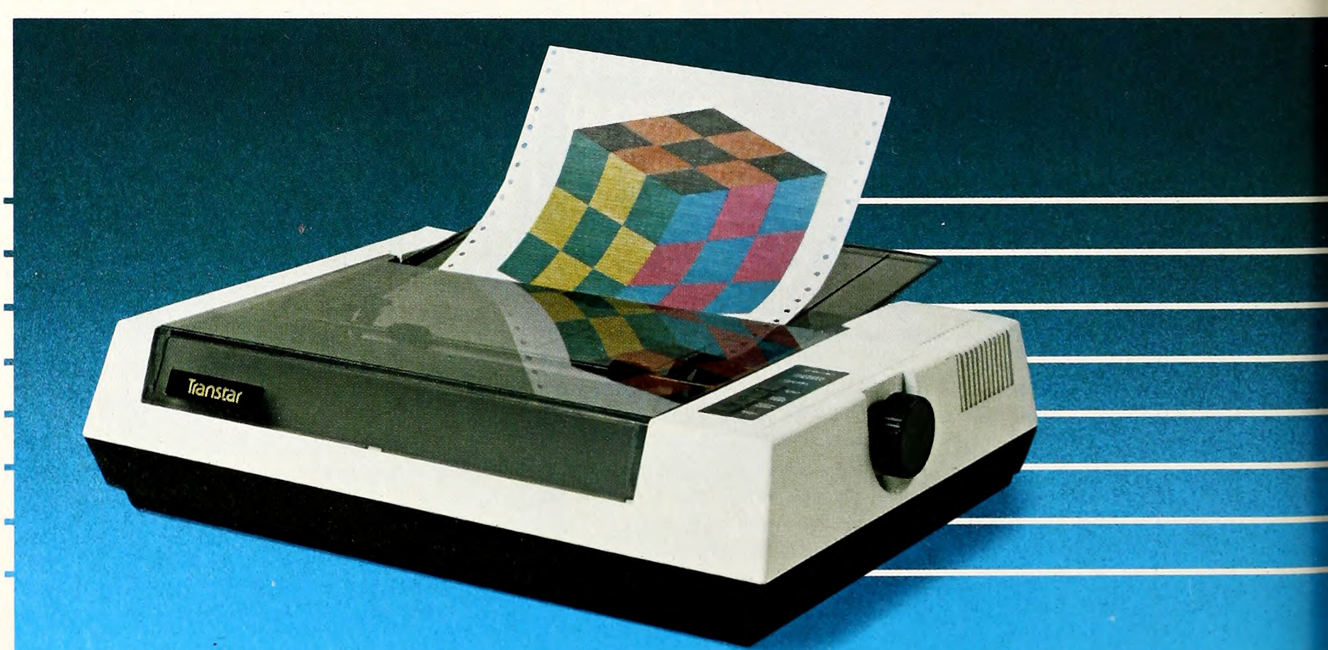

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Softalk Presents The Bestsellers

Maybe Parisians have the right idea. They take August off. Everyone goes on holiday for the month.

It isn't as if August were a month that only Father Time could love. There are a few others who could bask enjoyably in the hot summer sun. But for the most part, August sales were as flat as week-old 7-Up. A graph of July and August sales would make the Bonneville Salt Flats look like the Alps. Software was selling with all the elan of buggy whips.

It wasn't just software that suffered. Apple IIe sales flattened out also. In some parts of the country, August was the first time since the introduction of the IIe when it and all its usual peripherals were in plentiful supply. August suffered from a shortage of buyers.

Nobody's pushing the panic button, inasmuch as August isn't one of your prime retailing months in the first place. But when June and July showed unexpected strength, there had been hopes for a better August as well.

For all of August's shortcomings, it was a pretty good month for some folks.

Lord British managed to set some kind of record in August, although its merit is somewhat dubious. Under his own Origin Systems imprimatur, Lord British released *Ultima III* to hot demand. It barely hit the stores in August, but the early copies were snapped up in enough strength to push the program onto the Top Thirty in its first month of release. That's unusual, but it's not a record.

The record comes when you look at the Fantasy 5 listing. There reside three programs—all *Ultima*—written by Lord British and each published by a different publisher. It's the first and, most probably, the last time that one author has placed three programs on the Bestseller lists with three different publishers.

One can assume that now that he's self-published, Lord British will be content with his present publisher. In which case, he can probably retire the trophy for "Most Publishers Active in his Behalf."

He certainly won't be able to duplicate the feat next month. The original *Ultima* will almost surely be displaced by Sir-tech's *Legacy of Llylgamyn*, finally hitting the stores in mid-September after unexplained delays. *Llylgamyn* has the look of a third *Wizardry* hit for Andrew Greenberg and Robert Woodhead. The duo will probably duplicate Lord British's feat of having three programs on the Fantasy 5 list; but they always publish through Sir-tech, so they'll never lay claim to the most publishers title.

Another who prospered in August was Sophie, the beagle of Beagle Bros fame. As exposed elsewhere in this issue, Sophie is really the brains behind Beagle Bros and Bert Kersey is her front man. You can't argue with success, however; and Sophie sure has an abundance of that.

For the second consecutive month, there are seven Beagle Bros programs on the Hobby 10 list. The astonishing thing is that this month's seven aren't just last month's seven repeated. Some dropped out and others jumped in to take their place. That's a depth of product that other software (dog?) houses would love to exhibit.

The gravy on Sophie's dog biscuit is the fact that Kersey's whimsical and modest *Beagle Bag* outsold all but a handful of arcade glitterers to

Apple III

This Month	Last Month	
1.	1.	**Apple Writer III**, Paul Lutus, Apple Computer
2.	2.	**VisiCalc: Advanced Version**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	8.	**The Catalyst**, Tim Gill, Quark Engineering
4.	4.	**PFS:Report**, John Page, Software Publishing Corporation
5.	5.	**General Ledger**, Great Plains Software
6.	10.	**Word Juggler**, Tim Gill, Quark Engineering
7.	6.	**Quick File III**, Rupert Lissner, Apple Computer
8.	7.	**Apple III Business Basic**, Apple Computer
9.	—	**Accounts Receivable**, Great Plains Software
10.	—	**Accounts Payable**, Great Plains Software

Arcade 10

This Month	Last Month	
1.	2.	**Lode Runner**, Doug Smith, Broderbund Software
2.	1.	**Zaxxon**, John Garcia, Datasoft
3.	3.	**Miner 2049er**, Mike Livesay and Bill Hogue, Micro Fun
4.	5.	**Choplifter**, Dan Gorlin, Broderbund Software
5.	4.	**Hard Hat Mack**, Michael Abbott and Matthew Alexander, Electronic Arts
6.	6.	**Frogger**, Olaf Lubeck, Sierra On-Line
7.	9.	**Sammy Lightfoot**, Warren Schwader, Sierra On-Line
8.	—	**Beagle Bag**, Bert Kersey, Beagle Bros
9.	—	**The Last Gladiator**, John Field, Electronic Arts
10.	—	**Pinball Construction Set**, Bill Budge, BudgeCo

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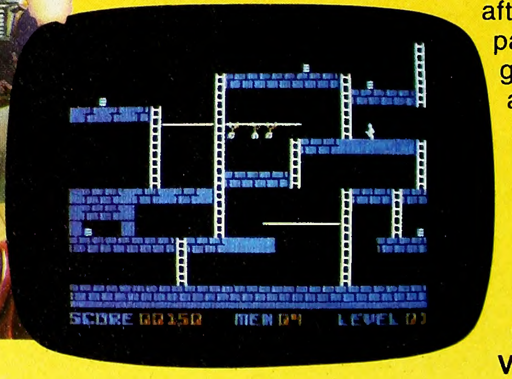


rank well up on the Arcade 10 list. Heaven help *VisiCalc* if Kersey decides to publish a fun spreadsheet.

The success of Beagle Bros actually bolstered interest in other Hobby 10 products as well. *Bag of Tricks*, that long-runner from Quality Software, not only resurfaced, but came in strong enough to score on the Top Thirty as well. Penguin scored with two graphics packages and Phoenix's *Zoom Grafix* regained a list that grew beyond ten entries because of ties.

Spinnaker Software also fared well as August closed out their first year as suppliers in the home education market. Three of their products—*Facemaker*, *Snooper Troops I*, and *Delta Drawing*—scored in the Education 10 list. The eleventh and twelfth programs, *Story Machine* and *Snooper Troops II*, were also from Spinnaker. That's an astounding performance in an area that's become one of the most competitive software markets.

Of course, *MasterType* continued to lead the category, with *Apple Logo* and *Computer SAT* following in reverse order from last month. The major change was the appearance on the list of DLM's *Arcademic Skill Builders in Math*, which made fifth place on the Education 10 list.

Another company that didn't seem affected by the August doldrums was Infocom. With monotonous regularity, they've been grabbing four of the five positions on the Adventure 5 list. August was no different. *Zork I*, granddaddy of the clan, remained the top adventure.

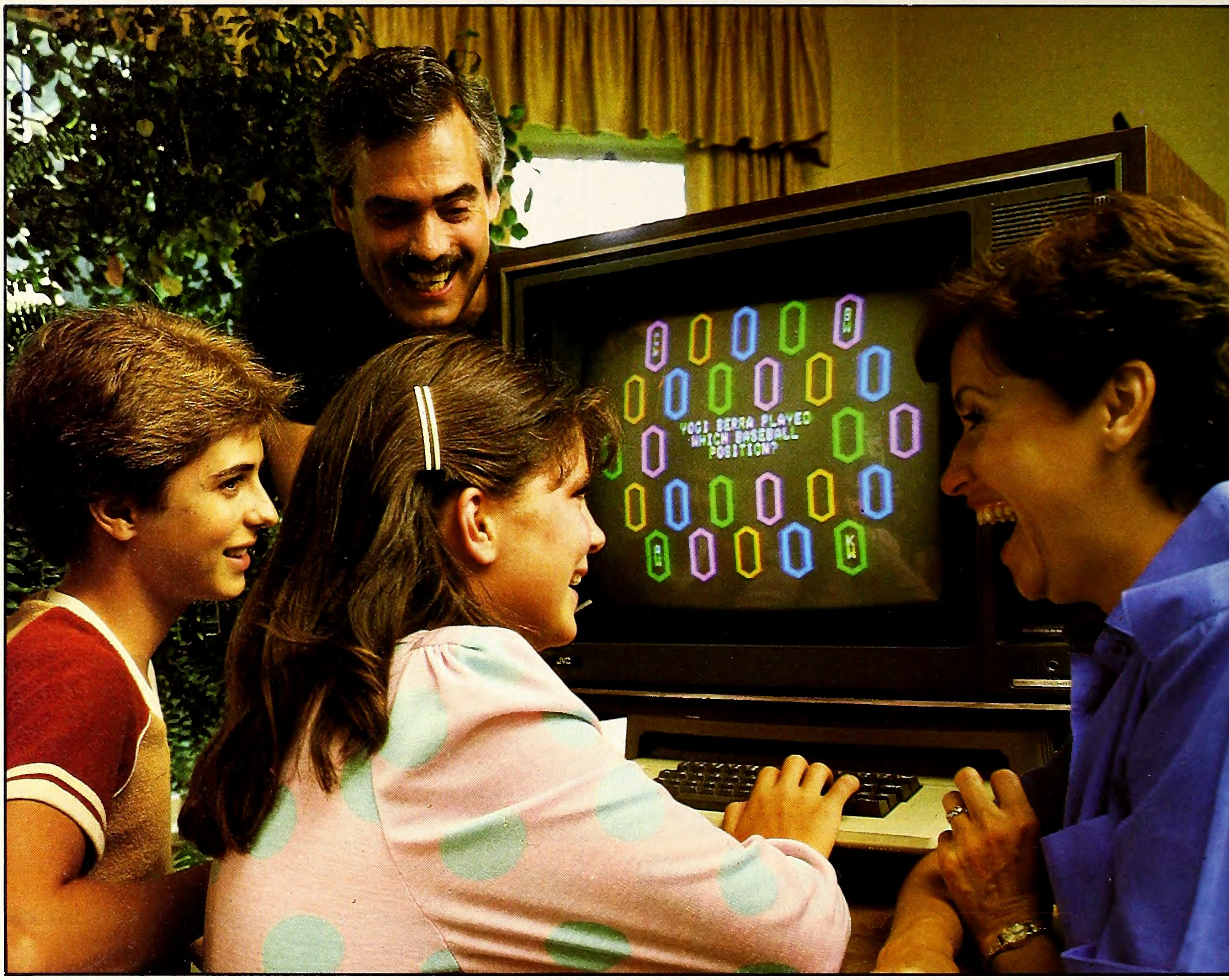
It would have been a clean sweep for Infocom had not *Death in the Caribbean* grabbed its second consecutive third-place finish. Micro Fun's new graphic adventure prevented *Zork III* from making the list.

Word Processors 10

This Month	Last Month	
1.	1.	**Apple Writer IIe**, Paul Lutus, Apple Computer
2.	2.	**Bank Street Writer**, Gene Kuzmiak and the Bank Street College of Education, Broderbund Software
3.	3.	**WordStar**, MicroPro
4.	4.	**Sensible Speller**, Charles Hartley, Sensible Software
5.	6.	**Format-II**, G.K. Beckmann and M.A.R. Hardwick, Kensington Microware
6.	—	**Apple Writer II Pre-Boot Disk**, Kevin Armstrong and Mark Borgerson, Videx
7.	—	**Word Handler**, Leonard Elekman, Silicon Valley Systems
8.	8.	**MegaWriter**, Megahaus
9.	5.	**Magic Window II**, Bill Depew, Artsci
10.	7.	**Screen Writer II**, David Kidwell, Sierra On-Line

Home Education 10

This Month	Last Month	
1.	1.	**MasterType**, Bruce Zweig, Lightning Software
2.	3.	**Apple Logo**, Logo Computer Systems, Apple Computer
3.	2.	**Computer SAT**, Harcourt Brace Jovanovich
4.	9.	**Facemaker**, DesignWare, Spinnaker Software
5.	—	**Arcademic Skill Builders in Math**, Jerry Chaffin and Bill Maxwell, DLM
6.	5.	**Typing Tutor**, Image Producers, Microsoft
7.	4.	**Early Games for Young Children**, John Paulson, Counterpoint Software
8.	8.	**Snooper Troops I**, Tom Snyder, Spinnaker Software
9.	—	**Algebra I**, Edu-Ware Services
	10.	**Delta Drawing**, Computer Access Corporation, Spinnaker Software



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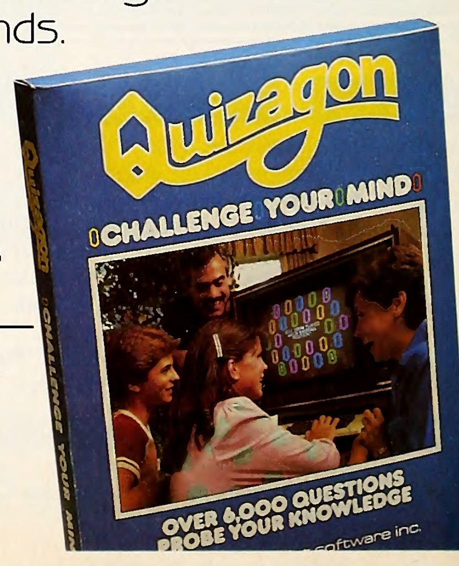

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August was a particularly tough month on strategy game sales. Top sellers sold fewer copies than in previous months and far fewer titles overall were moved through retail channels.

Flight Simulator wrested the lead in the Strategy 5 category from *Castle Wolfenstein*, which dropped to third. *Spitfire Simulator*, an irregular performer, had a comparatively strong August and jumped into second. Two chess programs finished off the category—*Sargon II* and *Chess 7.0*. The October introduction of *Sargon III* should bring that competition into clearer focus.

Another depressed area was the home market. Sales were off throughout the category, and, as with the Strategy 5, far fewer titles received any kind of mention. *Home Accountant* continued its dominance of the Home 10, which changed little from last month.

Sales of business products held about even, with strength in accounting packages offsetting weaknesses in some other areas.

VisiCalc remains the leader and continues to maintain its distance from its most direct competitor—*Multiplan*. *PFS:File* continues as runner-up in the category to *VisiCalc* and is still holding off third-place *Quick File IIe* for top honors among the filing programs.

Ashton-Tate's *dBase II* is outdistancing other database managers by a wide margin. The BPI accounting series, sold by Apple, remains the choice for accounting, with three modules in the Business 10. State of the Art's packages and *Accounting Plus* are both mounting challenges.

It was business as usual at the top of the Word Processing 10 chart, but there were a couple of minor surprises in the lower half of the list. The *Apple Writer II Pre-Boot Disk* by Videx, thought to be moribund

Adventure 5

This Month	Last Month	
1.	1.	**Zork I**, Infocom
2.	—	**Witness**, Infocom
3.	3.	**Death in the Caribbean**, Philip and Bob Hess, Micro Fun
4.	—	**Deadline**, Infocom
5.	5.	**Zork II**, Infocom

Strategy 5

This Month	Last Month	
1.	2.	**Flight Simulator**, Bruce Artwick, SubLogic
2.	—	**Spitfire Simulator**, Ted Kurtz, Mind Systems
3.	1.	**Castle Wolfenstein**, Silas Warner, Muse
4.	3.	**Sargon II**, Dan and Kathe Spracklen, Hayden
5.	—	**Chess 7.0**, Larry Atkin, Odesta

Fantasy 5

This Month	Last Month	
1.	1.	**Wizardry**, Andrew Greenberg and Robert Woodhead, Sir-tech
2.	—	**Exodus: Ultima III**, Lord British, Origin Systems
3.	3.	**Ultima II**, Lord British, Sierra On-Line
4.	2.	**Knight of Diamonds**, Andrew Greenberg and Robert Woodhead, Sir-tech
5.	5.	**Ultima**, Lord British, California Pacific

now that only IIes were being sold, jumped to sixth as a number of II Plus owners decided to stop looking enviously at their IIe neighbors and upgrade to the same capability.

The other resuscitation was *Word Handler*, a program that had fallen

Business 10

This Month	Last Month	
1.	1.	**VisiCalc**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	**PFS:File**, John Page and D.D. Roberts, Software Publishing Corporation
3.	3.	**Quick File IIe**, Rupert Lissner, Apple Computer
4.	4.	**Multiplan**, Microsoft
5.	5.	**PFS:Report**, John Page, Software Publishing Corporation
6.	8.	**BPI General Ledger**, John Moss and Ken Debower, Apple Computer
7.	6.	**PFS:Graph**, Bessie Chin and Stephen Hill, Software Publishing Corporation
8.	—	**dBase II**, Wayne Ratliff, Ashton-Tate
9.	—	**BPI Accounts Payable**, John Moss and Ken Debower, Apple Computer
	—	**BPI Accounts Receivable**, John Moss and Ken Debower, Apple Computer
	—	**General Ledger**, George Shackelford, State of the Art

Hobby 10

This Month	Last Month	
1.	1.	**DOS Boss**, Bert Kersey and Jack Cassidy, Beagle Bros
2.	1.	**Double-Take**, Mark Simonsen, Beagle Bros
3.	—	**Bag of Tricks**, Don Worth and Pieter Lechner, Quality Software
4.	—	**Beagle Basic**, Mark Simonsen, Beagle Bros
5.	10.	**Graphics Magician**, Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
6.	3.	**Apple Mechanic**, Bert Kersey, Beagle Bros
7.	8.	**Apple Pascal**, Apple Computer
8.	4.	**Pronto DOS**, Tom Weishaar, Beagle Bros
9.	9.	**Utility City**, Bert Kersey, Beagle Bros
10.	—	**Alpha Plot**, Bert Kersey and Jack Cassidy, Beagle Bros
	—	**Zoom Grafix**, Dav Holle, Phoenix Software
	—	**The Complete Graphics System**, Mark Pelczarski, Penguin Software

Home 10

This Month	Last Month	
1.	1.	**Home Accountant**, Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	2.	**ASCII Express:The Professional**, Bill Blue and Mark Robbins, Southwestern Data Systems
3.	5.	**Hayes Terminal Program**, Hayes Microcomputer Products
4.	4.	**Micro Cookbook**, Brian E. Skiba, Virtual Combinatics
	6.	**Cdex Training for the Apple IIe**, Cdex Corporation
6.	8.	**Transend 1**, Tim Dygert and Bob Kniskern, SSM
	—	**The Accountant**, Ernest Forman, Decision Support Systems
8.	10.	**Data Capture 4.0**, George McClellan and David Hughes, Southeastern Software
	7.	**Micro/Terminal**, Microcom
10.	—	**Know Your Apple IIe**, Muse

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on hard times when the IIe came out. It scrambled its way back to seventh on the list and may be ready for another surge such as the one it enjoyed late in 1982.

The tightest contest for supremacy was in the Arcade 10 category, where only a handful of units separated *Lode Runner* from second-place *Zaxxon*. Overall sales of arcade games also slipped significantly, although about the same number of titles remained active in the market.

Electronic Arts has yet to have its first big winner, but it's doing okay in the meantime. *Hard Hat Mack* came in fifth, *The Last Gladiator* scored ninth, and *Axis Assassin* was eleventh. In addition, they share distribution on Bill Budge's *Pinball Construction Set*, the tenth-rated program.

Accounting was also big on the Apple III in August. Three modules of Great Plains accounting software made the top ten, as the North Dakota firm has outdistanced other Apple III accounting suppliers. *Apple Writer III* remained the leader, with *VisiCalc:Advanced Version* in second place.

Apple-franchised retail stores representing approximately 5.1 percent of all sales of Apple and Apple-related products volunteered to participate in the poll.

Respondents were contacted early in September to ascertain their sales for the month of August.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preferences of the individual respondents were not considered.

Respondents in September represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only to the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 3.72 percent, which translates roughly into the theoretical possibility of a change of 4.03 points, plus or minus, in any index number.

The Top Thirty

This Month	Last Month	Index	
1.	1.	193.23	**Apple Writer IIe**, Paul Lutus, Apple Computer
2.	2.	98.44	**VisiCalc**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	8.	88.35	**Bank Street Writer**, Gene Kuzmiak and the Bank Street College of Education, Broderbund Software
4.	3.	85.65	**PFS:File**, John Page and D.D. Roberts, Software Publishing Corporation
5.	10.	72.16	**Lode Runner**, Doug Smith, Broderbund Software
6.	4.	71.82	**Zaxxon**, John Garcia, Datasoft
7.	5.	65.08	**Quick File IIe**, Rupert Lissner, Apple Computer
8.	7.	56.31	**Home Accountant**, Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
9.	6.	51.93	**Multiplan**, Microsoft
10.	9.	50.24	**MasterType**, Bruce Zweig, Lightning Software
11.	11.	32.71	**PFS:Report**, John Page, Software Publishing Corporation
12.	12.	28.32	**Wizardry**, Andrew Greenberg and Robert Woodhead, Sir-tech
13.	13.	27.31	**Miner 2049er**, Mike Livesay and Bill Hogue, Micro Fun
14.	21.	26.97	**WordStar**, MicroPro
15.	20.	25.96	**Apple Logo**, Logo Computer Systems, Apple Computer
16.	16.	22.59	**DOS Boss**, Bert Kersey and Jack Cassidy, Beagle Bros
17.	—	21.91	**BPI General Ledger**, John Moss and Ken Debower, Apple Computer
	19.	21.91	**Computer SAT**, Harcourt Brace Jovanovich
19.	23.	20.90	**Sensible Speller**, Charles Hartley, Sensible Software
20.	15.	19.22	**Choplifter**, Dan Gorlin, Broderbund Software
21.	24.	17.53	**Zork I**, Infocom
22.	24.	16.52	**ASCII Express:The Professional**, Bill Blue and Mark Robbins, Southwestern Data Systems
23.	—	15.84	**Facemaker**, DesignWare, Spinnaker Software
	16.	15.84	**Double-Take**, Mark Simonsen, Beagle Bros
25.	—	14.83	**PFS:Graph**, Bessie Chin and Stephen Hill, Software Publishing Corporation
	14.	14.83	**Hard Hat Mack**, Mike Abbott and Matthew Alexander, Electronic Arts
27.	—	14.50	**Bag of Tricks**, Don Worth and Pieter Lechner, Quality Software
	—	14.50	**dBase II**, Wayne Ratliff, Ashton-Tate
29.	—	14.16	**Arcademic Skill Builders in Math**, Jerry Chaffin and Bill Maxwell, DLM
	—	14.16	**Exodus:Ultima III**, Origin Systems


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